A SURVEY OF CANCER CASES ADMITTED TO SALT LAKE CITY HOSPITALS 1928-1934

By

MARGARET LOUISE PARSONS

A thesis submitted to the Faculty of the University of Utah in partial fulfillment of the requirements for the degree of MASTER OF ARTS.

June, 1936

Approved by:

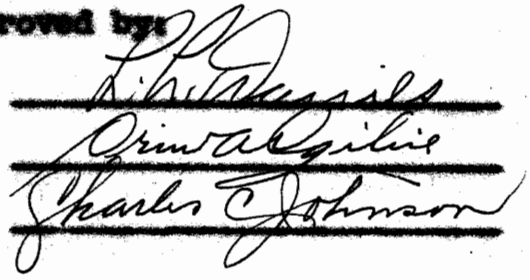


TABLE OF CONTENTS

TABLE OF CONTENTS (Cont'd)

LIST OF FIGURES

LIST OF FIGURES (Cont'd)

LIST OF FIGURES (Cont'd)

LIST OF TABLES

LIST OF TABLES (Cont'd)

LIST OF TABLES (Cont'd)

LIST OF GRAPHS

LIST OF GRAPHS (Cont'd)

INTRODUCTION

1. PURPOSE:

In September 1932 the American Society for the Control of Cancer was asked by the Utah State Medical Association to conduct a survey of the entire state. Previous to this time there had been no definite or accurate knowledge of the cancer problem in this state, and the Medical Association realized "the need of a more complete organization of the forces to be utilized in the fight against cancer."[1] The survey was meant to determine the hospital and medical facilities in the State of Utah for the diagnosis and treatment of cancer. This was accomplished by means of questionnaires and a covering letter sent to all hospital superintendents throughout the State. The information requested concerned "bed capacity, equipment, number of patients, methods of handling cancer patients and other statistics."[2] The majority of the hospitals were visited and inspected by Dr. John M. Flude, the Society's Field Representative. The cancer problem was attacked with the purpose in view of determining the facilities for cancer control, and recommendations were made at the end of the

---

[1] Cancer Survey of Cancer (American Society for the Control of Cancer, 1932) page 1.

[2] Ibid., page 3.

survey. Beyond cancer mortality statistics in 1929 and 1930, the incidence of cancer in the hospitals was not determined.

Dr. MacCarty divides the cancer problem into five parts. The second part concerns the statistical frequency of the disease and its possibility to that of other forms of life.[1] This thesis attempts to determine the frequency of various factors of the disease and the incidence of the disease in the hospitals of Salt Lake City. The objectives determined are those of:

(1) An increase in the number of cancer patients admitted to Salt Lake hospitals during the ten year period 1926-1935.

(2) The incidence of cancer among hospital patients with regard to:

- (a) age
- (b) sex
- (c) location of tumor
- (d) cause
- (e) treatment
- (f) occupation of the patient concerned
- (g) death rate

These objectives are brought out under discussions of the

---

[1] William Carpenter MacCarty, "The Cancer Problem Today", Journal of the American Medical Association (September 29, 1934) Vol. 103 pages 957-959.

different types of malignant tumors. This has been done in order to show the variations in types of malignancies with regard to age, sex, location, death rate and any possible increase during the ten years.

A proposal made by the American Society for the Control of Cancer in the Survey mentioned on page one referred to the assembling of a good collection of slides to be loaned to physicians and to be used in medical classes in order to arouse interest in the cancer problem. The first phase of this thesis problem was the making of such slides, which were consequently turned over to the Pathology Department of the University of Utah.

2. SCOPE:

The data gathered for this thesis cover all cancer patients admitted to the Holy Cross, Saint Marks, Latter Day Saints and Salt Lake County General Hospitals. In order to obtain a better idea of any increase and to have a larger group from which to draw more accurate conclusions, a ten year period (1925-1935) was chosen. Two thousand four hundred and nine cases of cancer were found in a total admission of one hundred fifty-two thousand, seven hundred and sixty-five patients during the ten year period. This large a group affords a valuable source of information from which one can draw important conclusions.

5. METHOD:

With the approval of the Pathology Department of the University of Utah, work was begun on this thesis September, 1934. It was originally planned to have the study cover all hospitals in Utah, but due to lack of funds and equipment, it was necessary to limit the survey to the four hospitals in Salt Lake City, namely, Latter Day Saints, Holy Cross, Saint Marks and Salt Lake County General Hospitals.

The historians of each hospital gave the writer full access to the records. Each hospital has a record of patients diagnosed as having some type of tumor benign or malignant. Only malignant tumors are considered in the survey, and by means of index numbers the hospital charts of cancerous patients were obtained.

The hospital record of each patient was completely read, and the information classified as indicated on page five. These records are of the type usually found in hospitals; the admittance and discharge sheet giving the name, age, occupation and residence of the patient; the personal history sheet giving the history of the patient and his parents; treatment and the doctors' orders sheets giving clues to type of treatment used and to the patients' condition; X-ray and laboratory sheets; nurses' notes; autopsy records; and operative notes showing the surgery done and any pathologic report on tissue sent to the laboratory. All

of these were carefully read and the data gathered.

Wherever given, the pathological report was used as a basis of diagnosis in preference to the clinical diagnosis. Two thousand four hundred and nine cases of malignancy were found during the ten year period, and of these, one thousand two hundred and sixty-two cases had been diagnosed pathologically. There were only seventy-two autopsies performed, and in two cases autopsies were done but no report was made as to procedure or findings. The specimens sent to the pathologist were taken during operations and were often chosen from a site uninvolved. A large part of the time no specimen was sent at all. Wherever the pathological report was not given, was recorded as "no specimen received", as "fatty tissue", or there was no record of an autopsy, the clinical diagnosis was accepted.

The data gathered were classified under the following twenty-four headings:

1. Patients living
2. Patients dying
3. Record of post-mortem examination
4. Age of patient at time of admittance
5. Male
6. Female
7. Occupation of patient
8. Clinical diagnosis
9. Pathological diagnosis

10. Time elapsing between first symptoms and first diagnosis of malignancy
11. Lesion localized at time of admission to hospital
12. If lesion metastasizing, site of metastasis
13. History of recurrance of tumor, site of recurrence
14. History of chronic irritation
15. History of injury
16. History of precancerous lesion
17. History of cancer in the family
18. No explainable cause indicated, record incomplete
19. Treated surgically
20. Treated with radium
21. Treated with X-ray
22. Treated palliatively
23. Treated to establish diagnosis
24. Cause of death

The name of each patient, his address if a non-resident of Utah, and the doctor's name were recorded, and the patient numbered. The number was then carried through the headings given above. With the exception of one hospital which could give only the number of discharges, the numbers of patients admitted to each hospital during the period of ten years were obtained. These same figures were added and used as a basis to determine what percentage of hospitalized cases were cancer patients. From this it was found that one and

five tenths percent of hospitalized cases are cancer cases. It is interesting to note the higher percentage in the number of deaths. There were seven thousand nine hundred and eighty-nine deaths in the hospitals. There were six hundred forty-seven cancer deaths, which means that eight percent of the deaths were due to cancer.

The data assembled were then tabulated according to age ranges, types of treatment used, occupational factors, etiologic factors and location of the tumor. This was done for male and female, living and dead patients diagnosed pathologically or clinically as having some type of malignant tumor. Percentages were determined from the above tabulations for each type of malignancy.

A complete statistical study was not possible, and percentage ratios were chosen. It was found impossible to set up a control for any of the tabulations. Occupations and types of treatment, for instance, could not be determined prior to the patients' admission to the hospital. The patient may have had cancer, for example, long before he came to the hospital; he may have been employed differently at the onset of the tumor than the occupation given on his hospital record would indicate.

No death rates are figured per the 100,000 or 1,000 population standards of the United States Registration area. This is done, because the number of cancer cases given here are only those admitted to the four Salt Lake hospitals.

The number of cancer cases in the State or even in Salt Lake City are not totally represented. Another influencing factor is that many hospital admittances came from other states. Of the 2,409 cases of cancer admitted to Salt Lake hospitals, 227 cases were patients coming from states other than Utah. For these two reasons it was decided the results would be more accurate if given by the numbers found and not by making standard rates.

Statistics obtained from the United States Department of Commerce, Bureau of the Census, give an idea of the conditions in Utah and Salt Lake City in comparison with the United States Registration Area.

TABLE I.

Death Rates From All Causes Exclusive Of Still Births Per 100,000 Population

Year	U. S. Reg. Area	UTAH	Salt Lake City
1930	13.0	11.5	14.3
1931	11.1	8.7	11.6
1932	10.9	8.6	11.1

From this table it can be seen there has been a decrease in the death rates from all causes. The rates appear high for Salt Lake City, but this is to be expected since a large percentage of the population of Utah is concentrated in this city. The relatively high rate seen in Table I is found in all the tables. Notice the decrease in death rates from 1930 to 1933.

TABLE II

Death Rates From Cancer And Other Malignant Tumors Per 100,000 Population

Year	U. S. Reg. Area	UTAH	Salt Lake City
1920	83.2	55.3	85.6
1931	98.9	68.6	111.2
1932	102.2	77.7	135.6

The cancer death rate for Salt Lake City appears unusually high. As mentioned above, Salt Lake is the largest city in Utah and has four well equipped hospitals which draw patients to this city. While the death rates from all causes decrease, the rates from cancer are steadily increasing. Heart disease leads as the most frequent cause of death, but cancer in the latest mortality statistics is leading a close second.

The occupations were found to be so varied that no classification of types of occupation could be worked up to show direct relationships between the disease and the occupation. An occupational classification prepared by the Bureau of Census was chosen.[2] The occupations have been grouped under similar types of work and this grouping is excellent for the general classification found here. The Occupational

[2]The Occupational Classification has been prepared for the Work Division by the Division of Research Statistics and Finance of the Federal Emergency Relief Administration, with the assistance of the United States Employment Service, the Construction Code Authority, and the Occupational Information Division of the New York State Employment Service. The coding scheme is adapted from that used by the United States Bureau of the Census in the Census of 1930.

Classification is presented in two forms: (1) a group arrangement and (2) an alphabetical arrangement. The group arrangement was chosen since it included about six hundred and fifty types of occupations. These were all classified under twelve major headings which are outlined on pages x-xiv Under each major heading are included examples of the types of occupations found.

I. Professional and Technical Workers

A. Accountants- C. P. A.

B. Actors

C. Architects

D. Artists, Sculptors and Teachers of Art

E. Chemists, Assayers and Metallurgists

F. Clergymen

G. Dentists

H. Designers

I. Dieticians and nutritionists

J. Engineers

K. Lawyers, Judges and Justices

L. Librarians

M. Musicians

N. Nurses

O. Physicians and Surgeons

P. Reporters, Editors, Journalists

Q. Teachers

II. Proprietors, Managers, Officials

A. Brokers, Bankers and Bank Cashiers

B. Building Contractors

C. Buyers and Shippers

D. Foresters, Forest Rangers

E. Hucksters, Peddlers and Rag Dealers

F. Officials and Inspectors

G. Postmaster

H. Retail Dealers and Managers

I. Wholesale Dealers

III. Office Workers

A. Accountants

B. Advertising Agents

C. Agents

D. Auditors

E. Bookkeepers

F. Cashiers

G. Clerks

H. Messengers

I. Stenographers

J. Inspectors

K. Telegraph Operators

IV. Salesmen and Kindred Workers

A. Auctioneers

B. Canvassers

C. Collectors

D. Demonstrators

E. Insurance Agents

F. Newsboys

V. Skilled Workers and Foremen in Building and Construction

A. Blacksmith

B. Boilermakers

C. Bricklayers

D. Carpenters

E. Cement Finishers

F. Electricians

G. Painters

H. Roofers

I. Steel Workers

VI. Skilled Workers and Foremen in Manufacturing and Other Industries

A. Cabinet Makers

B. Cobblers and Shoe Repairmen

C. Engravers

D. Furriers

E. Glass Blowers

F. Jewelers- except Dealers

G. Machinists

H. Mechanics

I. Millers

J. Molders

K. Printers

L. Conductors

M. Policemen

N. Firemen

VII. Semi-skilled Workers in Building and Construction

A. Apprentices

B. Blasters

C. Helpers

D. Operators

E. Riggers

F. Rivet Heaters

G. Truck Drivers

H. Welders

VIII. Semi-skilled Workers in Manufacture and Other Industries

A. Apprentices

B. Bakers

C. Bookbinders

D. Buffers and Polishers

E. Dressmakers

F. Tanners

G. Operatives

H. Butchers

I. Sailors

IX. Unskilled Laborers

A. Laborers

B. Fishermen

C. Garbagemen

D. Hod Carriers

E. Stage and Circus hands

F. Street Cleaners

G. Teamsters

X. Domestic and Personal Service Workers

A. Bakers

B. Bartenders

C. Cleaners and Charwomen

D. Cooks and Chefs

E. Dishwashers

F. Gardners

G. Janitors

H. Stewards

XI. Farm Operators and Laborers

A. Farm Owners

B. Farm Croppers

C. Farm Tenants

D. Farm Foremen, Managers and Overseers

E. Farm Laborers

XII. Inexperienced Persons

A. Persons sixteen to twenty-four years of age inclusive

B. Persons twenty-five and over with no occupational experience

Part I of this thesis includes an illustrated classification of all malignant tumors. The pictures were made from gross specimens brought to the Pathology Department from the hospitals and often from other cities in Utah. The material came from autopsies, biopsies or operations. Some of the pictures were taken of specimens in the Pathology Museum. From the gross material paraffin sections were made, and microphotographs taken of the slides. These pictures are used to explain and describe the various types of malignant tumors given in Part II.

I want to express my appreciation to Dr. Daines and Dr. Ogilvie for the help they have given me in contacting the hospitals, in gathering the material for slides and statistics and in the general supervision of the thesis. I want to thank Dr. Walter P. Cottam of the Botany Department for the photographs of the gross specimens and for his generosity in letting me use his equipment in taking the microphotographs. The work done by Mr. Dan Jones on these photographs is greatly appreciated, as is also the cooperation given me by Mrs. Eskins, Historian of the Holy Cross, Miss Knewton, Historian of the Latter Day Saints Hospital, Miss Sorenson, Historian of Saint Marks, and the Historian of the Salt Lake County Hospital, Miss Harkness.

PART I

CLASSIFICATION AND DESCRIPTION OF MALIGNANT TUMORS

PART I

CHAPTER I

CLASSIFICATION AND DESCRIPTION OF MALIGNANT TUMORS

The classification used here is taken from one given by William Boyd in his book, "A Text Book of Pathology." The book was written for students, and the classification is clear, easy to understand and complete. Since only the malignant tumors are being considered in the theses, the benign have been eliminated from the following classification.

I. Connective Tissue Tumors
   A. Sarcoma
      1. Cytological classification
         a. round cell
            1) small
            2) large
         b. spindle cell
            1) small
            2) large
         c. giant cell
         d. mixed cell
      2. Histological classification
         a. fibrosarcoma

b. neurosarcoma

c. osteosarcoma

d. liposarcoma

e. myxosarcoma

B. Chordoma

II. Malignant Lymphoma

A. Lymphosarcoma

B. Hodgkins Disease

C. Multiple Myeloma

III. Malignant Melanoma

IV. Epithelial Tumors

A. Carcinoma

1. Squamous cell

a. prickle cell

b. basal cell

c. transitional cell

2. Glandular

a. adenocarcinoma

b. carcinoma simplex

1) scirrhous

2) medullary or encephaloid

3. Miscellaneous

a. colloid carcinoma

b. anaplastic carcinoma

V. Special forms of epithelial tumors

A. Hypernephroma

B. Chorionepithelioma

C. Adamantinoma

The tumors are described from the standpoint of gross appearance, microscopic appearance, method of spread and differentiating characteristics. No attempt has been made to discuss the chemistry, etiology, symptoms or other factors here. Part I is intended to give a foundation for the malignancies found in the survey, and therefore only a description of the fundamental characteristics for a differentiation of type of malignancy is given. There is not space enough here to give a more detailed description.

CHAPTER II

CONNECTIVE TISSUE TUMORS

I. Sarcoma:

A Sarcoma is a malignant tumor of connective tissue. The word "sarcoma" comes from the Greek word "sark" meaning "flesh", and this gives a clue as to the gross appearance of this tumor. The tumor appears fleshy, soft and vascular. Figure 1 below shows a sarcoma of the spinal column.

Fig. 1. A Primary Alveolar Round Cell Sarcoma Of The Spinal Column; Primary In The Periosteum Of The Vertebrae

The sarcoma shown here was a highly cellular tumor in an advanced stage. Necrosis and mucoid degeneration have occurred and the tumor appears more friable and less circumscribed as is the usual case. The growth of the tumor has been so rapid that its blood supply has been outstripped. As a result, infarction has occurred and the necrosis and mucoid degeneration can be seen in the center of the tumor mass. The vertebrae have been practically destroyed. Toward the periphery of the mass the tumor is fairly well circumscribed. The consistency of this tumor was soft and like the white matter of the brain. This is true of the least differentiated sarcoma. The greater the differentiation the more the consistency of the tumor will change. For example, an osteosarcoma may be hard as bone and a fibrosarcoma firm and resistant. A sarcoma seems to grow on a network of fine blood vessels. There is usually not the appearance of infiltration seen commonly in carcinoma. The thin-walled vessels are easily ruptured by the tumor cells, and hemorrhages are the rule.

With the exception of certain definite characteristics, the microscopic appearance of a sarcoma varies with the type of cell. To quote from Boyd, "Two methods may be used in the classification of the sarcoma. The first is cytological, the second histological. In the first, the tissue is named according to the form of cell which predominates ***. This method is the refuge of the destitute, and should be avoided

to the utmost of one's ability."[1] The histological method is the classification preferred and should be used whenever the amount of differentiation makes it at all possible. The least differentiated tumors show scanty stroma and many cells, and often the only classification to use is the cytological one. The tumor pictured in Figures 2 and 3 on page 7 is one of this type. The growth was highly cellular and rapidly growing. The section seen in Figure 2 was taken near the center in an attempt to get some of the periosteum. Cartilage cells can be seen in the photograph. The tumor cells are characteristic of a sarcoma; they are arranged evenly and sheet-like. There is no alveolar grouping. The cells are separated by stroma which in the lower right foreground is scanty. In this tumor the cells are small, round and have very dark staining properties. Mitotic figures, while not possible to make them out here, can often be found in most of the more malignant sarcomas. Because the section was taken from an area of the tumor losing its blood supply, the characteristic blood vessels can't be seen in Figure 2. The tumor cells usually appear to be growing on numerous thin-walled blood vessels or sinusoids.

As might be expected a sarcoma spreads and metastasizes by way of the blood vessels. The vessels are so numerous and thin-walled that the tumor cells have little trouble

---

[1] William Boyd, "A Text Book of Pathology (Lea and Febiger, Philadelphia, 1932) page 246.

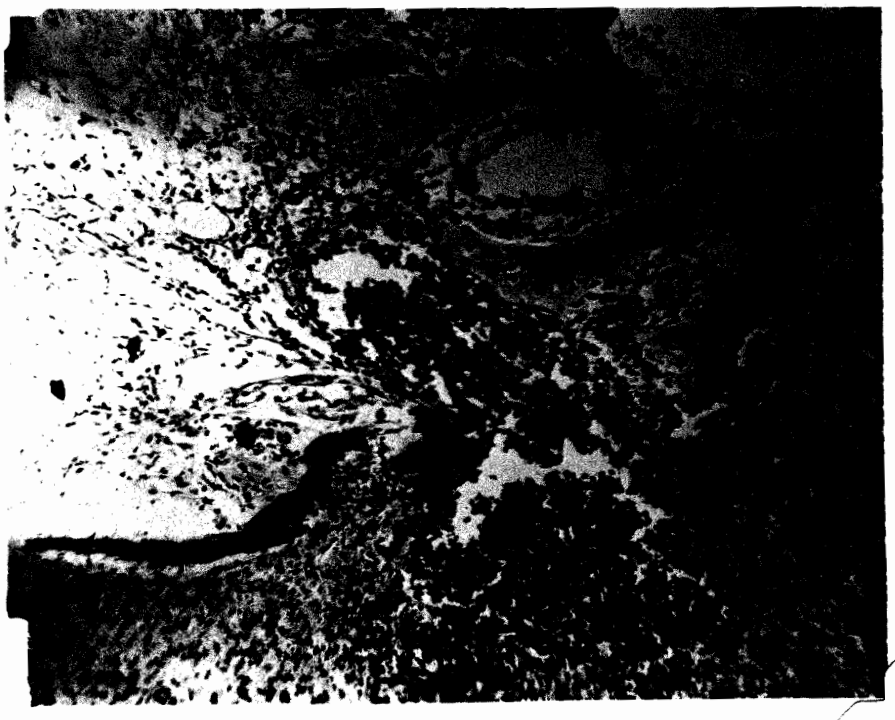


Fig.2. An Alveolar Round Cell Sarcoma Primary In The Periosteum Surrounding The Vertebrae.

Fig.3. Secondary Round Cell Sarcoma of Lung--Primary In Periosteum Of The Vertebrae.

penetrating the walls and entering the blood stream. To a lesser extent spread occurs from the infiltration of surrounding tissue by the tumor cells progressing along fascial planes, between muscle fibers, through Haversian canals, along vessels and nerves and directly into soft tissues. Having this method of spread, the round cell sarcoma pictured on page 4 shows the expected sites of metastases. Figure 4 shows metastatic nodules in the lung and a

Fig.4. Secondary Round Cell Sarcoma of the Lung and the Renal Vein. Primary in the Periosteum of the Vertebral Column.

large metastatic growth in the renal vein. Besides these sites the tumor cells infiltrated diffusely the fat and lymph nodes surrounding the primary lesion. Ewing traces the course of the cells when he writes "cell-emboli thus pass readily into the vessels and lodge first in the lungs, liver, kidney, spleen and other organs and tissues."[1] The main characteristics of this tumor to remember are:

1. The lack of alveolar grouping of tumor cells.
2. The stroma present between the cells.
3. The sheet-like arrangement of the cells.
4. The tending to reproduce some form of connective tissue.
5. The more circumscribed appearance of the gross specimen.
6. The presence of numerous thin-walled blood vessels.

There are, of course, variations in these points, but as a general rule they fit the sarcoma.

II. Chordoma:

The second type of malignant tissue is the chordoma. There were no cases of this encountered in the survey covering a ten year period. It is a tumor arising from remnants of the notochord and is found at the upper or lower ends of the vertebral column. The tumor grows slowly, is of elastic consistency and shows many areas of translucent chordal

---

[1] James Ewing, Neoplastic Diseases, (W. B. Saunders Comp., Philadelphia and London, 1928) 3rd Edition, page 259.

tissue separated by hemorrhagic patches. Macroscopically it shows crowded, large, clear cells with no intercellular substance.

CHAPTER III

MALIGNANT LYMPHOMAS

I. Lymphosarcoma:

The lymphosarcoma is a malignant tumor arising from lymph nodes and lymphoid tissue in general. Its local destructive capacity and the formation of true metastases in distant organs are the main distinguishing characteristics of this type of malignancy.[1]

This growth appears from the gross specimen much like Hodgkins disease. However, lymphosarcomas show a more invasive and destructive action on the surrounding tissue. The yellow patches seen in Hodgkin's disease are not found in this lesion. Necrosis is not as common here. The tumor pictured (page 12) shows extensive invasion of all the tissue surrounding the heart - the whole mediastinum. The heart is completely boxed in by a bulky mass. The large vessels of the heart can be seen in the center of the tumor mass. The outlines of separate lymphnodes are completely obliterated, and invasion and destruction of the surrounding tissue have taken place. Occlusion of blood vessels may result in extensive necrosis, but the tumor mass pictured here has a fleshy vascular appearance. The tissue is soft in consistency, and on cross section presents a rather

---

[1] Ewing, Op. Cit. page 413.

granular appearance. This mass had several hemorrhagic areas.

Fig.5. Mediastinal Lymphosarcoma Involving The Heart.

A section taken from one of these areas shows in the microphotograph on page 13 many thin-walled blood vessels. Notice the lack of destruction of the walls of the vessels. Tumor cells can be seen in the lumen of a few of the vessels, but the thin wall remains intact. It has not been destroyed, as is often the case in sarcoma, but invasion of the vessel does occur. The type cell pictured here is the small round and dark staining lymphocytic cell. The cells are evenly distributed and are separated from each other by a fine stroma.

This tumor is then the first type of lymphosarcoma as classified by Ewing. Lymphoid tissue is composed of lymphocytic and reticulo-endothelial cells and these determine the type of tumor. Stout gives a third type. "The third

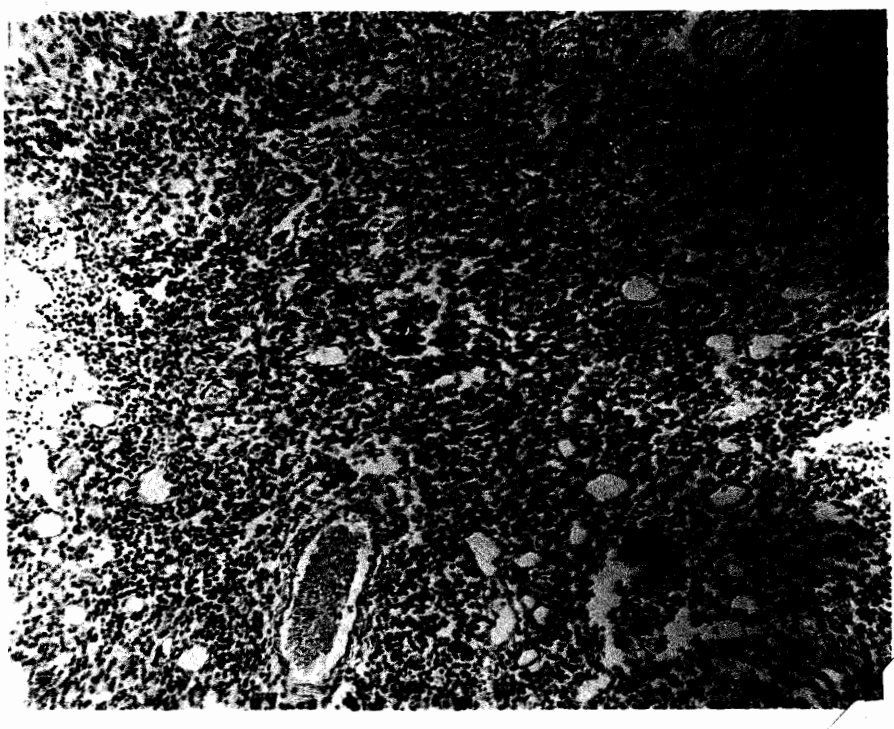


Fig.6. Mediastinal Lymphosarcoma..

type of growth comes from ordinary fibrous tissue of the lymph nodes and exhibits all the variations possible from fibrillar sarcomas to the very malignant poorly differentiated forms in which cells are of all sizes and shapes, without definite arrangement into bundles and with all degrees of fibrillar thickness, number and irregularity."[1] The first type of tumor is the lymphocytic type. The cells are those pictured above and appear identical with the lymphocyte.

[1] Arthur Purdy Stout- Human Cancer (Lea and Febiger, Phil. 1932) p. 823.

Ewing names this tumor as "malignant lymphocytoma". The second type he calls the "reticulum cell sarcoma or large round cell lymphosarcoma". The cells seen in this type are "large, pale, irregular in shape, with vesicular nucleus, and the arrangement tends to be more open."[1] It is important to designate the type of tumor, as the treatment will vary with the type. The lymphocytic type is treated successfully with radiation while the reticulum-cell type is more resistant.

Extension and metastasis take place in this case by way of the lymphatics. The blood vessels are often invaded but according to Ewing "The adventitia of large blood-vessels is invaded, but the media resists."[2] "The disease, which is invariably fatal, may invade the entire lymphoid apparatus of the body, not only the lymph nodes, but the lymphoid tissue in the pharynx (tonsil, etc.) gastro-intestinal canal, spleen, bone-marrow, liver and other organs."[3]

The points to remember here are those of:

1. The extent of destruction of surrounding tissue.
2. Formation of many distant and true metastases.
3. The two cell types. Stout's third type seems to belong more to the sarcoma group.
4. Spread by way of the lymphatics in contrast to the blood spread of sarcoma.

---

[1] William Boyd, a Text Book of Pathology (Lea & Febiger, Phil. 1932) p. 731.
[2] James Ewing- Neoplastic Diseases, p. 415.
[3] William Boyd- a Text Book of Pathology, p. 730.

5. Arrangement of cells is diffuse and has an intercellular stroma.
6. The invasion but not destruction of the blood vessels.

II. Hodgkin's Disease:

"This is a disease of the hemopoietic organs, i.e., bone-marrow, lymph nodes, spleen and liver. It is invariably fatal."[1] During the time this study was being made no specimens of Hodgkin's disease were brought to the Pathology Department, and no photographs could be taken.

The disease is not unlike the lymphosarcoma in appearance. The lymph nodes affected are usually the retroperitoneal, mesenteric or mediastinal and the external chains of nodes such as the cervical, epitrochlear, and clavicular and inguinal nodes. The nodes gradually increase in size and finally become fused together. The lesion appears circumscribed until an advanced stage is reached. The tumor may show extensive invasion and destruction of surrounding tissue. Invasion of the walls of the blood vessels often occurs, and the vessel may be occluded by the tumor cells. In this stage necrosis occurs and the usual pale grey appearance of the cut surface appears yellow. The best example of this is seen in the spleen. Necrosis begins here in the lymphoid follicles and soon "Hodgkin's tissue" results. This tissue is yellow and the spleen will have suet-like patches of grey

[1] Ibid. page 727.

or yellow scattered all through it. In the liver the lesions are confined to the portal tracts. If the bone marrow is involved, it appears red and hyperplastic. Otherwise, the intestines, stomach, kidney, and wherever else there is lymphoid, tissue may show involvement.

The main distinguishing characteristics of this tumor are found with the microscope. "The microscopic appearance is the same wherever the lesions occur, but in any one site it may be extremely varied in character. Indeed its pleomorphism is its most characteristic feature."[1] Ewing sums up the structure of the tumor in two brief sentences, "Typical Hodgkin's granuloma presents a characteristic structure on which depends its recognition as a specific disease. It consists of a reticulum in which lie a few small lymphocytes, large lymphocytes, plasma cells, eosinophile cells, proliferating endothelium and endothelial giant-cells."[2] In the early stage the lesion is richly cellular. There are many large pale cells with hyperchromatic nuclei. These cells come from the endothelial proliferation that is one of the first features seen in the growth of the tumor. Giant cells which may be mononuclear or multinuclear are numerous. These are commonly known as Dorothy Reed or Sternberg cells. The third characteristic cell is the eosinophil, which may be seen in varying numbers. Besides these cells, small and large lymphocytes, plasma cells and polymorphonuclear leuco-

---

[1] William Boyd- A Text Book of Pathology. p. 730.
[2] James Ewing- Neoplastic Diseases. p. 403.

cytes may be present. As the tumor grows, necrosis may occur, and due to the formation of a reticulum by the reticular cells of the gland, a dense fibrosis occurs.

From all indications, spread of this disease occurs by way of lymphatics, blood stream and local invasive properties.

The differentiating characteristics to be noticed here are those of:

1. The organs involved.
2. Method of spread.
3. The cellular picture of lymphocytes, plasma cells, eosinophils, Reed - Sternberg giant cells and leucocytes.
4. The suet-like appearance seen in certain phases of the disease.

III. Multiple Myeloma:

There was only one case of this malignancy found in the ten year period studied in the survey, and no material from which to prepare slides or to take photographs could be found. The tumor is rare and always fatal.

The distinguishing characteristic of this tumor is the multiple foci of origin. Many small nodules which may be small or large, circumscribed or diffusely scattered are found in the marrow of the bone of the ribs, sternum, vertebrae, skull, femur, pelvis and humerus. The frequency of involvement is in the order given here. The vascularity determines the appearance of the tumor which may be "soft or

firm, translucent or opaque and whitish, gray or deep red."[1] The bone tissue is absorbed and a thin shell is left, or perforations appear. There is no new bone formation, and as soon as the tumor cells pass the periosteum a diffuse invasion of surrounding tissue occurs.

The cellular structure of a multiple myeloma is pleomorphic. Ewing divides the cells into two classes. In the first class "the tumor is composed of loosely packed typical plasma cells, round, oval or polygonal and with opaque, amphophile, non-granular cytoplasm".[2] In a second group of cases "the cells are larger, giant-cells with multilobed nuclei appear, multiple and vesicular nuclei are prominent, nucleoli are large and acidophile, the resemblance to plasma cells is not striking, the tumors are more malignant and metastases occur."[3] The cells are diffusely arranged. There is no intercellular stroma but often a scanty stroma separates groups of cells.

Spread takes place by invasion of bone marrow. Metastasis is chiefly to other bones and occasionally to the liver, spleen, kidney, lung and ovaries. These metastases are uncommon, and as Boyd writes, are almost never found in the lungs.

Ewing classes this tumor by itself, but Boyd puts it among the tumors of hemopoietic tissues, the lymphoblastomas.

---

[1] Ewing- Op.Cit. p. 321.
[2] Ibid. Op.Cit. p. 325.
[3] Ibid. Op.Cit. p. 324.

He admits it does not resemble the lymphosarcoma, leukemia or Hodgkin's disease, and that it stands alone. However, since it is a tumor involving the bone marrow, it has been put in this group of malignancies.

Differentiating points to remember here are:

1. The multiple foci of origin.
2. The absorption of bone- an osteoclastic process with no new bone formation.
3. The pleomorphic cell picture showing plasma cells or giant cells as the predominating cell. Other cells present are lymphocytes, myelocytes and erythroblasts.
4. The diffuse arrangement of the cells and the lack of an intercellular stroma.
5. Spread resulting from a direct invasion of surrounding tissue caused by absorption and osteoclastic resorption of the bone.

CHAPTER IV

MALIGNANT MELANOMA

Melanomas are pigmented tumors appearing in a benign and a malignant form. In the benign form they are the naevi, commonly known as "moles". In the malignant form they are known as malignant melanoma or melanotic sarcoma. The last name is being dropped since the tumor is not a sarcoma.

The macroscopic appearance of the tumor varies. It may arise anywhere in the body. The skin is the most frequent site, and from here metastases spread everywhere. The tumors are usually pigmented varying from grey to light brown and black. They may not be pigmented at all; they may be single or multiple, and they may be soft and flat or papillomatous. Many show growth of hair which varies in amount from single hairs to the bathing trunk type. The malignant tumor shows an increased dark color, inflammation, soreness and ulceration. Usually the pigment is seen in the tumor or on the edges of the ulcer. Often, however, pigmentation may be absent.

The figure on page 21 is a microphotograph of a malignant melanoma of the skin. The tumor cells have gone deep into the tissue, the cells are hyperchromatic and mitotic figures can be seen. While not marked, there is a tendency to an alveolar grouping of the polyhedral cells. Usually

this characteristic is more marked, and the tumor has the appearance of a carcinoma. A fine stroma can be seen that seems to be separating groups of cells rather than being intercellular. The arrangement of cells varies, and accord-

Fig.7. A Malignant Melanoma of the Skin.

ing to Boyd, "no tumor presents a more varied picture than the melanoma, and it is not too much to say that it may simulate a carcinoma, sarcoma, endothelioma and even a lymphosarcoma."[1] There are three types of cells involved in the melanoma. There is the naevus cell which is non-pigmented,

[1]Boyd, Op.Cit., p. 257.

the melanoblast which produces melanin and the melanophore or chromatophore which many consider to be a phagocytic histiocyte which takes up the melanin produced by the melanoblast. The naevus cell is the cell type usually found in nonpigmented moles. The cell as seen in Figure 7 is fairly round, clear staining, has a dark nucleus, and occasional mitotic figures can be seen. The melanoblast is larger, polyhedral, has hyperchromatic nuclei and the cytoplasm contains melanin granules. These are the cells that seem to be forming an alveolar arrangement. The chromatophores can be rather easily picked out. Their shape varies from round to stellate and they are laden with pigment. These cells appear to be principally in the stroma outside of the alveolar groups of cell. Stout explains this appearance. "The mole cells, which contain pigment and in which the pigment is probably formed, are spoken of as melanoblasts, the stellate cells which contain larger masses of pigment are the melanophores (chromatophores)."[1]

This type of malignancy is characterized by widespread metastases. Spread takes place by means of the lymphatics and the blood stream. Hardly an organ will escape. The skin is usually the first site to show metastasis. Dr. Selig cites in the American Journal of Cancer an interesting case of metastatic melanoma. A patient was treated for melanoma of the groin, and, suspecting the tumor to be metastatic,

---

[1]Stout, Op.Cit., p. 553.

the patient was kept under observation. Four years later the primary lesion was found to be a non-pigmented melanoma of the right heel. There had been no trace of a primary tumor previous to this time. Constant trauma would probably account for the early metastasis. The tumor proved to be radio-resistant and the patient died seven years after appearance of the first metastasis. At the time of death there were symptoms of cerebral and spinal cord metastases.[1]

Distinguishing characteristics noticed here are:

1. The pigmented tumors appearing most frequently on the skin. They may not be pigmented.
2. The cellular picture showing the non-pigmented naevus cells, the polyhedral melanoblast containing granules of melanin and the chromatophore which is usually stellate and heavily laden with pigment.
3. The alveolar grouping of cells with a lack of intercellular stroma.
4. The widespread metastases affecting any part or organ of the body.
5. Spread taking place by means of lymph channels and blood stream.

---

[1] Seth Selig- The Metastasis of a Melanoma to the Groin Four Years Before the Appearance of the Primary Lesion on the Heel. American Journal of Cancer (March 1934) vol. 20, pp. 594-596.

CHAPTER V

CARCINOMA

I. Squamous-cell Carcinoma:

The squamous-cell carcinoma (also called epithelioma and epidermoid carcinoma) is found wherever squamous or transitional epithelium is found. Boyd gives three types of epithelioma, and these will be discussed separately.

(1) Prickle cell epithelioma.

Ewing designates this type as an "acanthoma or adult hormifying squamous carcinoma." This type appears in two forms. It is either papillomatous and has raised warty outgrowths tending to spread laterally, or they are flat, indurated and infiltrating.[1] Of the two, the second type is the more destructive. Figure 8 illustrates an epidermoid carci-

Fig.8. Epithelioma Of The Arm.

[1] Ewing- Op.Cit. p. 826.

noma of the first type. A more advanced stage is pictured here and ulceration has occurred. The edges are raised and nodular. The tumor is spreading laterally and destruction of the deeper tissues has occurred. The smaller growth to the right shows the more typical papillomatous appearance. Another tumor of the prickle-cell type is pictured below. It is not in as advanced a stage as is the tumor shown in Figure 8, and appears definitely papillomatous. It is a definite elevated warty outgrowth.

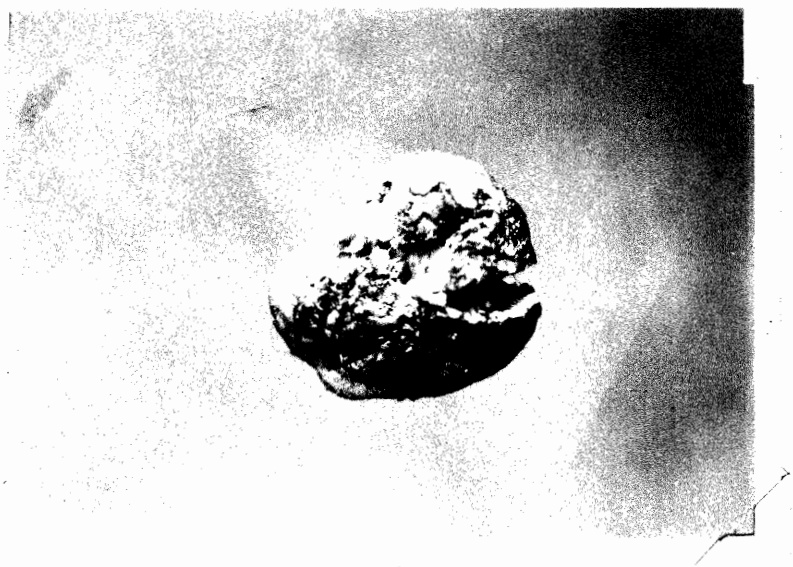


Fig.9. Epidermoid Carcinoma Of The Face.

The microphotograph of this tumor shows the typical cell arrangement seen in the acanthoma or prickle cell type which is the most differentiated of the squamous-cell carcinomas. The squamous epithelial cells extend down into the dermis. The prickle cells are in the center of the down-pushing epithelial cells. These cells tend to become flattened, form cell nests, fall into a whorl-like arrangement

and become cornified. These are called "epithelial pearls" or "onion bodies". The microphotograph below shows a well-developed pearl and two others in the process of being formed. The lymphocytic infiltration seen about the down growths is quite common.

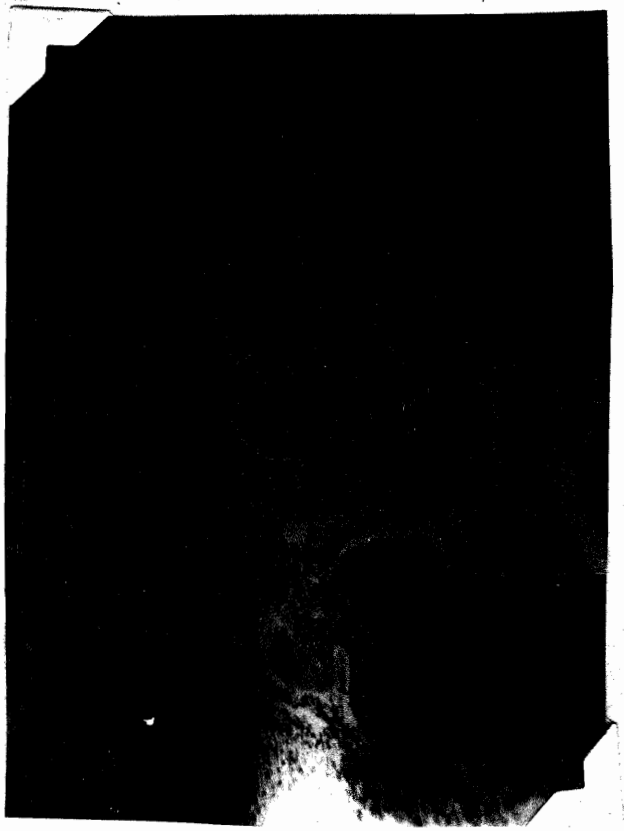


Fig.10. Epidermoid Carcinoma of the Face. Prickle-Cell Type.

Epidermoid carcinoma of the cervix uteri are frequent and present one of the commonest forms of carcinoma. The tumor may appear in the papillary form shown in Figure 11 or in the infiltrating form. The second form is accompanied by a graver prognosis than the first. The tumor cells invade the surrounding tissue, extend deep into the cervix and grow toward the internal os. Hemorrhage doesn't occur until the

tumor is fairly well developed. Extensive necrosis, sloughing and destruction of the cervix occurs. In the first type a large fungating mass may be seen projecting from the external os into the vagina. The growth is outward and not invasive as seen in the second form of growth. Hemorrhage is an early symptom, and the prognosis is much better than in the infiltrating type of growth.

Fig.11. Epidermoid Carcinoma of the Cervix Uteri.

There are two types of epithelium found in the cervix, and as a result two types of carcinoma appear. An adenocarcinoma arises from the simple columnar epithelium lining the cervical canal. This tumor is rare. The most common is epidermoid carcinoma arising from the stratified squamous epithelium covering the vaginal portion of the cervix. The tumor pictured in Figure 12 is of a squamous-cell carcinoma, prickle-cell type. In the upper center is seen the early formation of an epithelial pearl. There is a marked lymph-

ocytic infiltration. The tumor cells are fairly well differentiated, convoluted and are invading the underlying

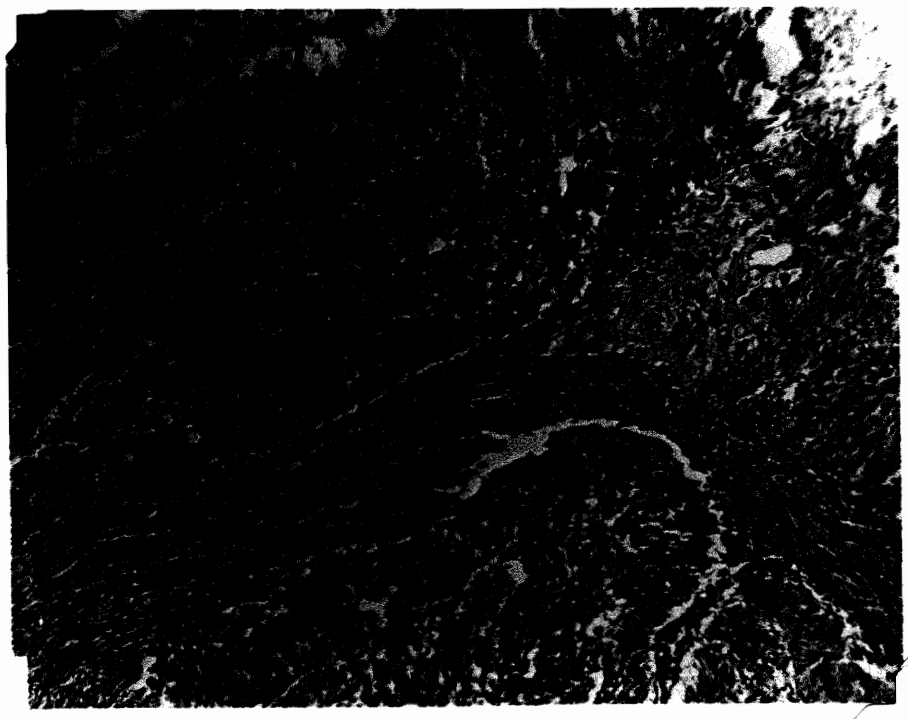


Fig.12. Epidermoid Carcinoma of the Cervix Uteri, Prickle-Cell Type.

tissue. This is an example of the plexiform arrangement. The epithelium may also occur in the adult formation seen in Figure 10, or in an anaplastic form in which the cells are undifferentiated and highly invasive.

(2) Basal-Cell Carcinoma.

"Two somewhat distinct, but related, histological types of tumor develop chiefly or exclusively from the basal cells of the malpighian layer of the skin, viz., (a) reticulated epithelioma, and (b) adenoid epithlioma."[1] The reticulated

[1] Ewing, Op.Cit., p. 877.

epithelioma is the rodent ulcer. Ewing has made this classification from the microscopic appearance of the tumor. This type of carcinoma is found on the face above a line drawn between the tip of the ear and the angle of the mouth, and usually attacks the cheek, nose, eyelid and ear. It grows slowly, seldom involves regional lymph nodes and seems to be of a low degree of malignancy.

The first type of basal cell carcinoma appears in the early stages as a flat papule, smooth wart or a pimple-like ulceration that "won't heal". Ulceration of these small lesions occurs often after several years have passed. It gradually destroys the skin down to the bone or muscle. In the late stages, the tumor is large and completely destroys all in its way. The base of the tumor is covered with granulation tissue; the edges are nodular, raised, indurated and hyperemic. The growth pictured in Figure 13 has been treated with X-ray. It doesn't conform entirely to the description given above. The tumor mass has become quite densely

Fig.13. Basal Cell Carcinoma of the Face.

sclerotic and shows none of the ulceration seen in more advanced stages.

Figure 14 is a microphotograph of the tumor pictured on page 29. Here again the characteristic appearance has been destroyed by the treatment used. Groups of dark staining cells in the dermis are separated by an increased amount of fibrous connective tissue. The X-ray treatment has caused a diffuse fibrosis and destruction of tumor cells. In the upper left-hand corner a portion of the basal cells of the epidermis seems to be extending down into the dermis. No connection between cell groups in the dermis and epidermis can be seen, however. The cells show alveolar or group arrangement with no intercellular stroma. Ewing describes the

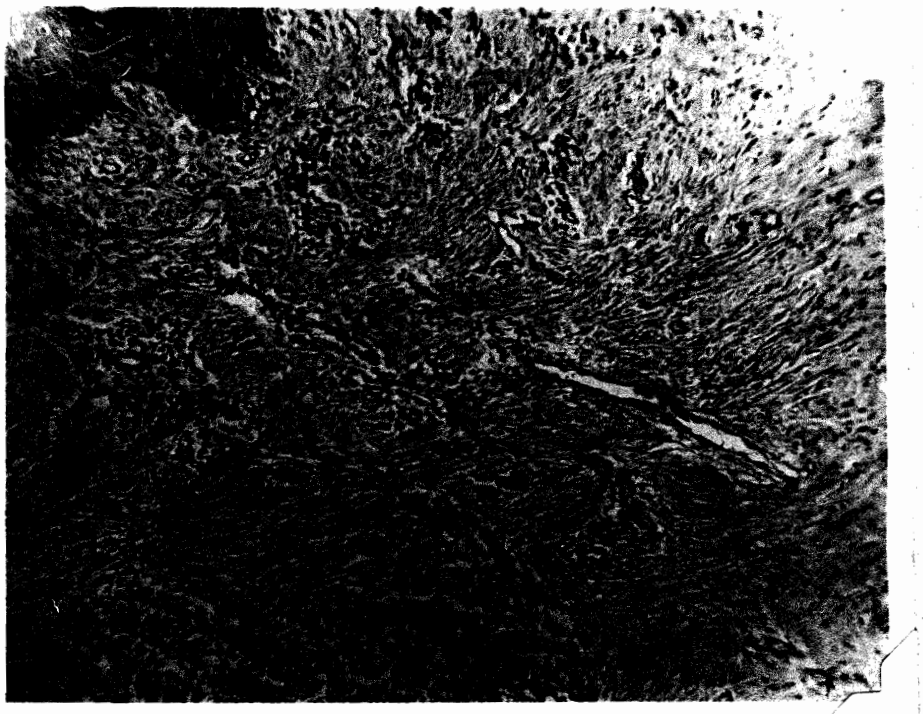


Fig.14. Basal Cell Carcinoma of the Face-
X-Ray Treated.

typical appearance of this tumor and justifies his classification. "Section shows relatively bulky, compact masses of darkly staining cells connected by narrow strands of similar cells, all lying in dilated lymph channels or artificial spaces from which they readily shrink on hardening."[1] These spaces may be seen in the microphotograph on page 30. There may, of course, be variations in this picture. The cells are small, polyhedral or spindle, with relatively large vesicular nuclei, minute nucleoli and scanty cytoplasm.

Ewing's second type of basal cell carcinoma, the adenoid epithelioma of skin, is a tumor tending to reproduce dermal glands. Since it is not malignant, it will be left out of this discussion.

(3) Transitional-Cell Carcinoma.

Wherever there tends to be a transition between simple and squamous epithelium this tumor may be found. The regions most likely to be affected are the mouth, pharynx, and nasal passages. Since it often affects the epithelium over the tonsils and deposits of lymphoid tissues, the tumor is often called "lympho-epithelioma".

The primary growth is small and highly infiltrative. Often it is not found until fairly extensive metastases have occurred. One of the first signs of the tumor is the marked involvement of the cervical lymph nodes. From these nodes the liver, lungs, bones and mediastinum are involved.

---

[1] Ewing, Op.Cit., p. 880.

The cells are arranged in sheets and are large, pale, indefinite in outline and have large nuclei. Mitotic figures are easy to find. The mistaken diagnosis of lymphosarcoma is often made from the involved lymph node. Many lymphocytes occurring with the tumor cells confuse the picture and make the diagnosis difficult.

Metastases of the squamous-cell carcinoma may occur by way of direct invasion of tissue spaces, permeation of lymphatics, lymphatic embolism and spread by way of the blood stream. In advanced stages this manner of spread is seen. The main method of spread occurs by way of the lymphatics and the epidermoid carcinomas are excellent examples. Spread by direct invasion is the fundamental method. All the carcinomas show it to some extent. However, the basal-cell epitheliomas rarely shows involvement of lymph nodes and spreads almost entirely by direct extension into surrounding tissues.

Differentiating characteristics of the squamous-cell carcinomas may best be shown as given below.

A. Prickle cell carcinoma or acanthoma.

1. Gross appearance.

a. Papillomatous or warty outgrowths.

b. Flat indurated and infiltrating growths.

2. Microscopic appearance.

a. Epithelial pearl.

b. Lymphocytic infiltration.

c. Cornification of the prickle cells.

3. Metastasis

a. Direct invasion of surrounding tissue.

b. Permeation of lymphatics.

B. Basal-cell Carcinoma.

1. Gross appearance.

a. Location of the tumor on the face.

b. Flat papule, smooth wart of ulcerating pimple-like growth that "won't heal".

2. Microscopic appearance.

a. Alveolar arrangements of cells.

b. Cell groups connected by similar cells lying in dilated lymph channels or spaces.

c. Lack of intercellular stroma.

3. Metastasis.

a. By direct invasion of surrounding tissues.

b. Rare involvement of regional lymph nodes.

C. Transitional-cell Carcinoma.

1. Gross appearance.

a. The small primary growth which is highly infiltrating.

b. Marked involvement of cervical lymph nodes which may be the first symptom.

c. Appearance wherever there is a transition between squamous and simple epithelium.

2. Microscopic appearance.

a. Sheet-like arrangement of cells.

b. No intercellular stroma.

c. Large, pale cells with large nuclei.

d. Large number of mitotic figures present.

3. Metastasis.

a. Lymphatic permeation.

II. Glandular Carcinoma.

This type of carcinoma arises from glandular epithelium. It occurs in two forms, the adenocarcinoma and the carcinoma simplex. Each has its common site and appearance, and each tumor will be discussed separately.

(1) Adenocarcinoma.

The common sites for this lesion are in the stomach, large intestine, gall-bladder, pancreas, uterus and prostate. It may occur in the breast and other glandular organs. The tumor cells arise from the columnar epithelial cells lining the glands and tend to reproduce the original gland alveoli.

The tumor shown in Figure 15 presents the picture usually seen in an advanced stage of adenocarcinoma of the stomach. The tumor is a large fungating mass filling practically the entire stomach. It extends from the cardia, seen at the top of the picture, to the pylorus. Ulceration accompanied by hemorrhage has occurred, and in the center of the tumor mass a shiny, homogeneous, gelatinous appearance can be seen. The tumor in this area has undergone gelatinous or mucoid degeneration. The submucosa is deeply infiltrated. An interesting thing about this case is that no diagnosis could be definitely established. From the symptoms a gastric carcinoma was strongly suspected, but X-ray examination re-

vealed absolutely no evidence of a tumor in spite of the large mass of tumor tissue present.

Fig.15. Papillary Adenocarcinoma of the Stomach Showing Mucoid Degeneration.

Fig.16. A Primary Adenocarcinoma of the Large Intestine.

The appearance of adenocarcinoma of the large intestine is fundamentally that given above for the stomach. The tumor may form as seen in Figure 16 where the tumor cells grow into the lumen of the bowel and form a fungating mass which soon ulcerates. The tumor may infiltrate the wall of the bowel and form an annular growth which will gradually cause stenosis of the canal. The portion of the bowel above the tumor is dilated and hypertrophied as would be expected to result from any obstruction in the bowel, while the portion of the intestine below the growth is collapsed and constricted.

Collagenous or mucoid degeneration is a frequent occurrence in these tumors. The tumor shown here has undergone early metastasis, two cites of which are pictured below. The liver is the common site of metastasis. Primary tumors of this organ are rare. Secondary tumors of the liver generally have the appearance of that shown in Figure 17. The colors of this specimen were vivid. The liver tissue was a

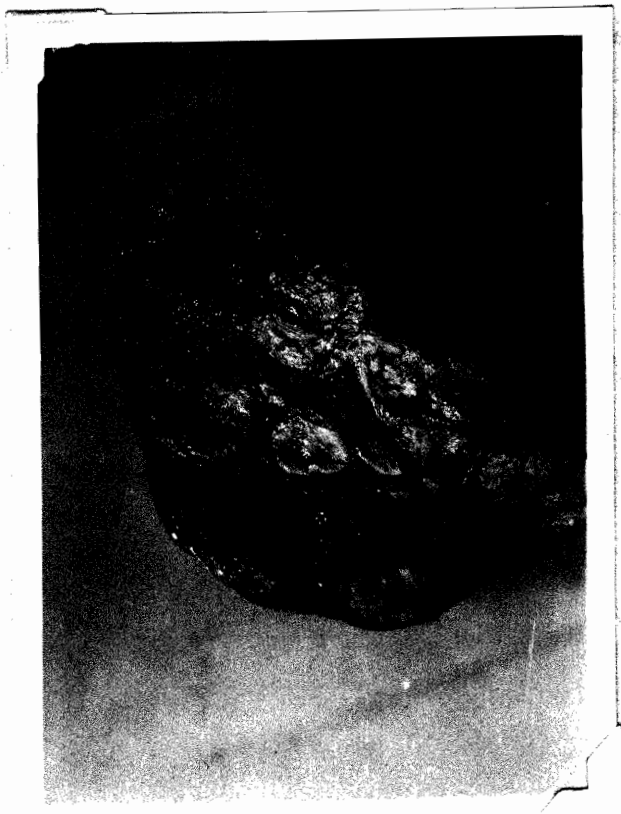


Fig.17. Secondary Adenocarcinoma of the Liver.

Fig.18. Secondary Adenocarcinoma of a Lymph Node.

deep purplish red, while the multiple tumors were whitish yellow. The tumors were soft in consistency, many showed necrosis, and as can be seen from the photograph, the size of the metastatic tumors varied. The lymph node shown is

enlarged, and the normal lymphatic tissue is completely replaced by tumor tissue. These secondary tumors have the same appearance as that seen in the liver. The microphotographs of these tumors are included in the discussion of the microscopic appearance.

The adenocarcinoma tends to reproduce the normal glandular tissue from which it arises. A typical glandular structure which varies with the degree of malignancy is seen under the microscope. The carcinoma pictured below shows well formed glands. However, these neoplastic glands have

Fig.19. Papillary Adenocarcinoma of the Stomach Showing Mucoid Degeneration.

hyperchromatic cells, processes branching off from the main gland, mitotic figures, no limiting basement membrane, cells in layers, some invading the surrounding tissue, and finally

these cells are deeper in the submucosa than the cells of the normal glands would be. All of these characteristics are those of an adenocarcinoma. The mucoid degeneration so clearly seen on page 34 is not well shown in this micro-photograph.

The abrupt change from normal glandular tissue to the malignant form is shown in the microphotograph of the tumor pictured in Figure 20. The cells of the normal glands are pale, mucinous and have small nuclei. In direct contrast notice the hyperchromatic cells and large nuclei of the tumor cells. These cells can be seen invading the submucosa much deeper than the normal glands. The branching processes from the neoplastic glands are well developed here.

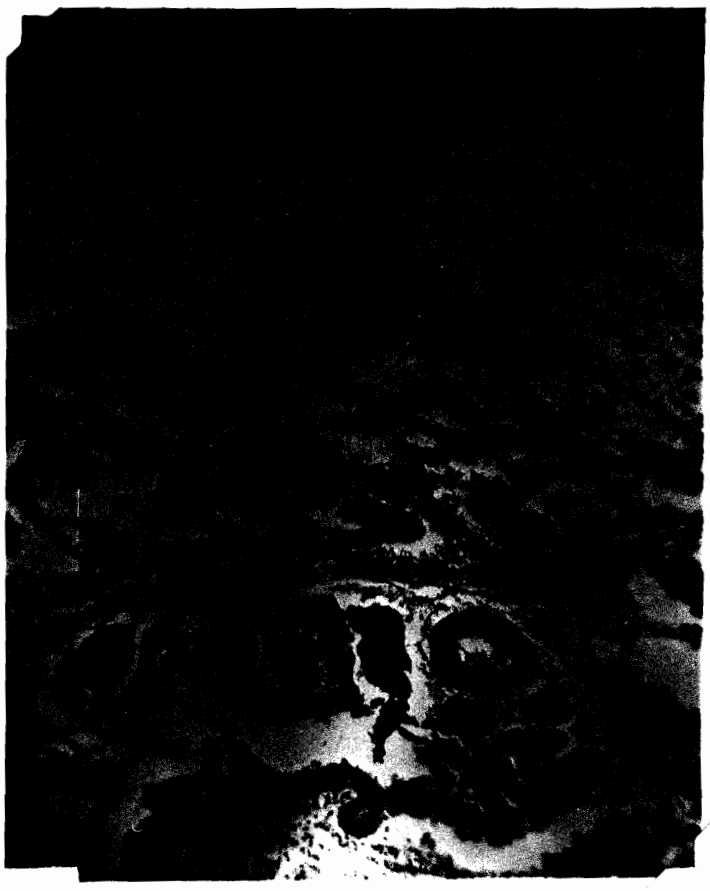


Fig.20. Primary Adenocarcinoma of the Large Intestine.

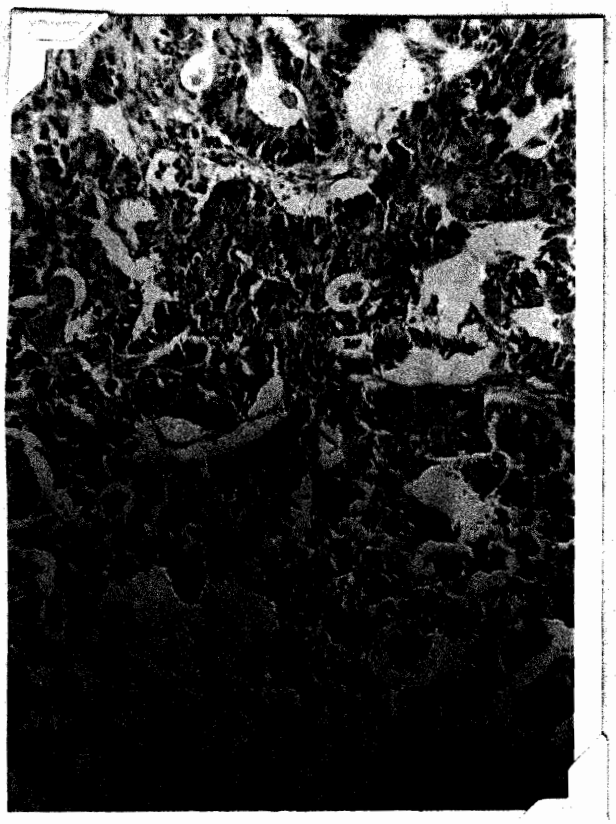


Fig.21. Secondary Adenocarcinoma of the Liver.

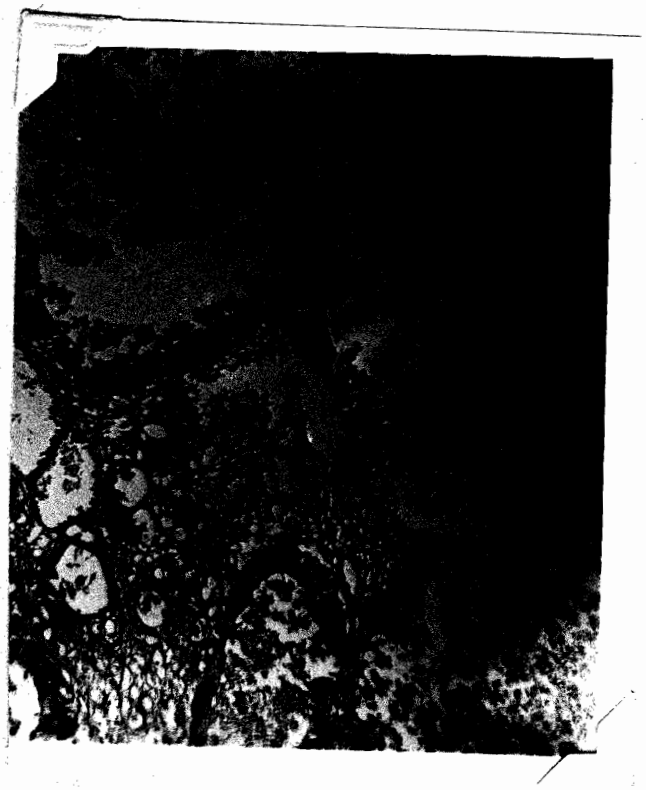


Fig.22. Secondary Adenocarcinoma of the Lymph Node.

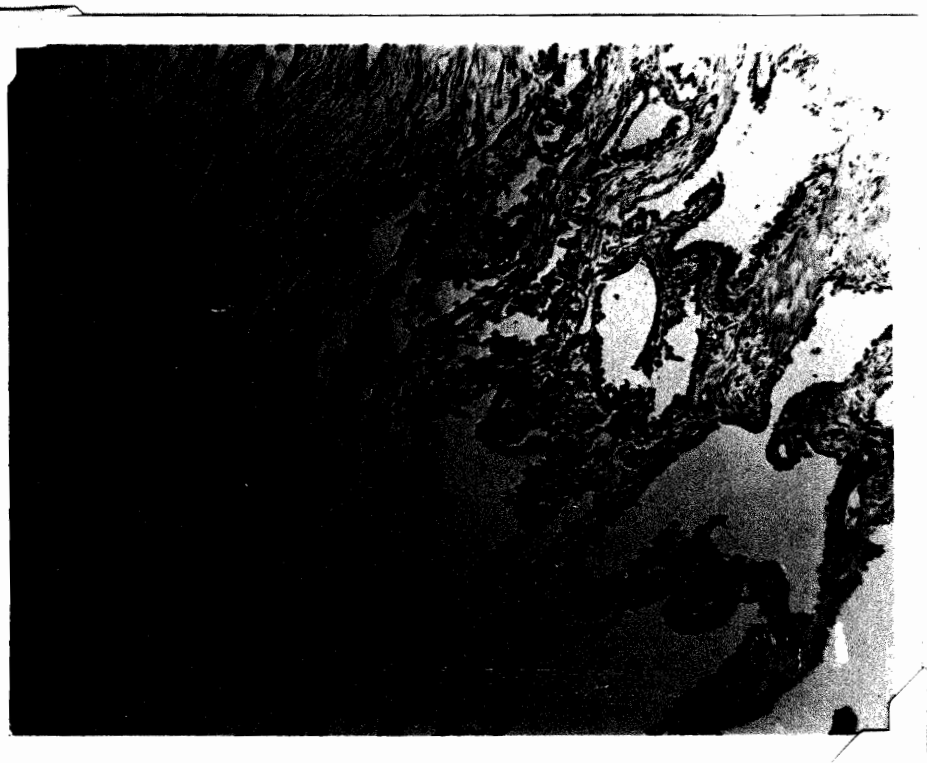


Fig.23. Adenocarcinoma of the Body of the Uterus.

Figures 21 and 22 are microphotographs taken from the secondary tumors in the liver and lymph node metastases discussed on page 35. The same cellular appearance is seen in the metastatic tumors as is seen in the primary. Neither illustration shows normal tissue. Necrosis of tissue seems to have progressed farther in the secondary tumors than in the primary.

Another interesting example of the tendency to reproduce the glands from which the tumor arises is seen in Figure 23. Cancer of the body of the uterus usually presents the picture of an adenocarcinoma. The tumor usually begins in the endometrium, and the newly formed neoplastic glands resemble "endometrial hyperplasia". This is shown in Figure 23 also. However, the glands are invading the uterine muscle, the cells are dark staining and the glands are branched and irregular. None of these factors is seen in the normal uterine gland.

The spread of an adenocarcinoma takes place by means of the four routes of local permeation, lymphatic permeation, lymphatic embolism, or by way of the blood stream. Secondary tumors of local organs and tissues are a result of local permeation or invasion of surrounding tissue. Spread to distant organs is a result of cell-emboli carried mainly by way of the lymphatic channels and often by way of the blood stream. Lymph node involvement is the commonest manifestation of metastasis. According to Ewing the lymph nodes in an adenocarcinoma of the breast may remain free from invasion over

long periods of time. The tumor pictured here is an excellent example of this. The nodes of the right neck showed

Pig.24. Secondary Adenocarcinoma of a Lymph Node. Primary Site of Tumor was in the Left Breast.

enlargement and on section were seen to be involved by an adenocarcinoma. Five years previous to this time the patient had had her left breast amputated for adenocarcinoma. Notice the alveolar grouping of the cells, and the neoplastic glands. The normal lymphoid structure has been completely destroyed. According to Ewing the adenocarcinomatous tumors "frequently arise in cysts and the cyst wall may long be retained."[1] This probably accounts for the long period before metastases appear.

[1] Ewing, Op.Cit., p. 550.

Secondary tumors involving the heart are rare. During the ten years covered by the survey, there was one case of primary adenocarcinoma of the descending colon showing on autopsy metastases to the retroperitoneal lymph glands, liver and right ventricular cardiac muscle. The patient was a woman of forty-eight years of age. The tumor can be seen in the lower left hand portion of the ventricular muscle. The

Fig.25. Secondary Adenocarcinoma of the Right Ventricular Muscle.

typical adenocarcinomatous structure is shown in the microphotograph of a section taken from the metastatic tumor pictured in Figure 25. The glands show deep involvement of the cardian muscle. The cells are hyperchromatic, are several layers deep, are invading the surrounding tissue and processes are branching from the neoplastic glands. An occa-

sional "bird's-eye inclusion" may be seen in the cancer cells.

Fig.26. Adenocarcinoma of the Right Ventricular Cardiac Muscle Secondary to the Descending Colon.

Differentiating characteristics of the adenocarcinoma are:

(1) Site of the primary tumor in the stomach, large intestine and sometimes the breast.

(2) The gross appearance of the tumor showing a soft, papillomatous and fungating growth.

(3) The frequent presence of mucoid degeneration.

(4) Spread chiefly by way of the lymphatics and the portal system.

(5) Tendency of the tumor cells to reproduce the normal glands from which they arise.

(6) The tumor cells characterized by alveolar grouping, hyperchromatic, large nuclei, deep invasion of the submucosa, cells several layers in depth and the branching processes from the neoplastic gland.

III. Carcinoma Simplex:

According to Boyd carcinoma simplex arises from the cubical epithelium of solid glands. The site most commonly involved is the breast. Ewing defines this tumor under the names of small and large alveolar carcinomas and tubular carcinoma. Depending on the number of cells present the carcinoma simplex is subdivided into scirrhous and medullary or encephaloid forms.

(1) Scirrhous Carcinoma.

This is the most common tumor of the breast. The tumor forms a hard circumscribed nodule found usually in the upper and outer quadrant of the mammary gland. The gross appearance of the scirrhous carcinoma is very characteristic. The tumor is hard and on cutting through the nodule it feels resistant and gritty. Three nodules may be seen in the fat of the tumor pictured here. The nodules are a greyish white color and are not homogeneous. Small spots are yellow and are separated from each other by whorls and streaks of white strands of fibrous tissue. Notice how

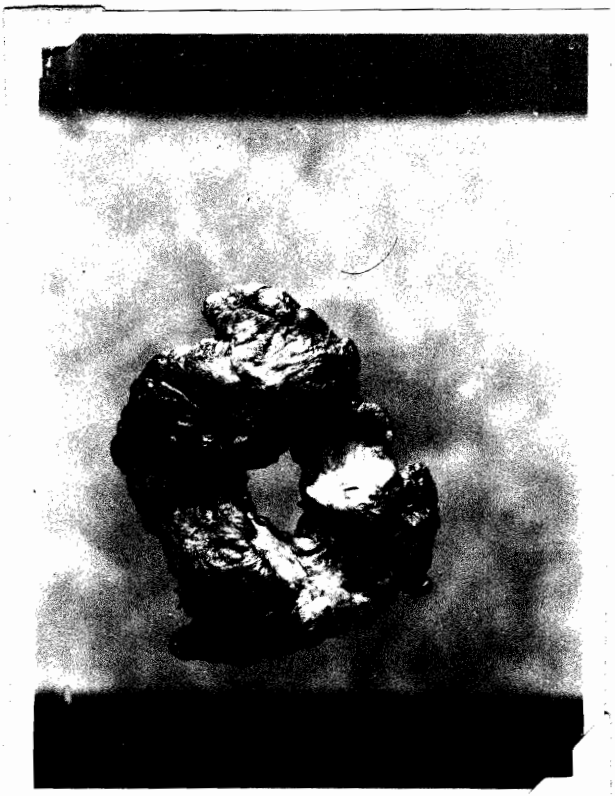


Fig.27. Scirrhous Carcinoma of the Breast.

the cut surface of the tumor is pulled in from the fatty glandular tissue surrounding the nodule. While on palpation the tumor feels circumscribed, direct invasion of the surrounding tissue does occur and can be seen in the photograph.

The microscopic appearance is equally characteristic. The cells are arranged in groups separated from each other by dense stroma. These cells replace the normal glandular tissue. The stroma is abundant and the predominant feature. There is no intercellular stroma. The dark staining hyperchromatic cells are usually polygonal in shape and small, but the dense stroma may cause the cell groups to be dis-

torted. There are many lymphocytes present in the tumor pictured in Figure 28. Mitotic figures are not common;

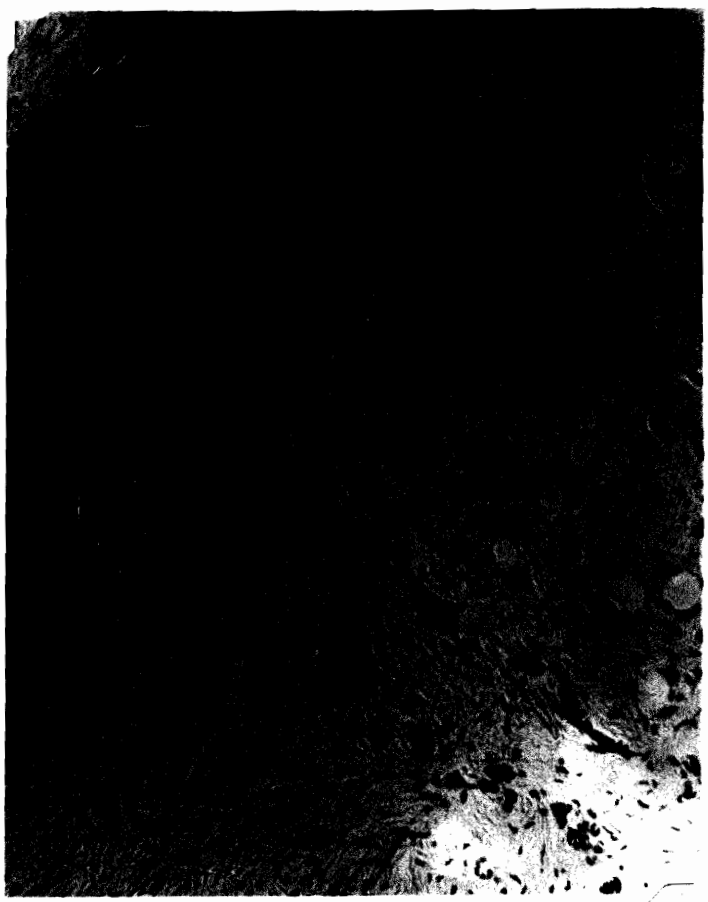


Fig.28. Scirrhous Carcinoma of the Breast.

none can be seen in this microphotograph.

While this type of carcinoma grows slowly into surrounding tissue, spread to distant lymph nodes and organs occurs early. Metastasis takes place chiefly by means of the lymphatics. Direct extension into the surrounding tissues is the next commonest method of spread. The blood stream method of metastasis is not so frequent.

(2) Medullary Carcinoma:

Because of its softness this tumor is often called encephaloid carcinoma. On gross inspection the tumor mass is soft and friable. It is more likely to produce an ulceration of the skin and a bulky mass than does the scirrhous type.

One of the first things noticed on microscopic examination is the difference in the cell-to-stroma ratio. There is very little stroma while the cells are remarkably increased over the number seen in the scirrhous carcinoma. The tumor is richly cellular and highly malignant. The cells are grouped in masses, are large, rounded and show many mitotic figures. There is no intercellular stroma.

In contrast to the slow growing scirrhous tumor, the medullary carcinoma is rapidly growing. There is early invasion of the surrounding tissue and skin, and the lymph nodes are involved at an early stage. The main methods of spread are those of direct extension and invasion of lymphatic channels. In the advanced stages the blood stream is invaded and secondary tumors appear anywhere in the body.

The following outline shows the different characteristics of these tumors.

1. Scirrhous Carcinoma.

   a. Small, hard, circumscribed nodules adhering to the skin and deep fascia.

b. Resistant to the knife and cut surface showing streaks of fibrous tissue containing specks of necrotic tumor cells.

c. Dark staining masses of cells separated by dense and abundant stroma.

d. Only occasional mitotic figures.

e. Slow invasion of surrounding tissue accompanied by early dissemination to regional lymph nodes.

f. Metastasis by means of lymphatics, direct extension and the blood stream in advanced stages.

2. Medullary carcinoma.

a. Bulky mass accompanied by frequent ulceration of skin.

b. Tumor mass friable and soft.

c. Cellular groups of large rounded cells separated by scanty stroma.

d. Many mitotic figures.

e. Highly malignant tumor invading rapidly the surrounding tissue and regional lymph nodes.

f. Metastasis by means of direct invasion, lymphatic channels and blood stream usually seen in advanced stages.

IV. Miscellaneous Carcinomas:

In this group are included the colloid carcinomas and the anaplastic carcinomas. Both are too important to be left out of the discussion.

(1) Colloid Carcinoma.

This carcinoma was shown on page 34. It is merely a carcinoma which has undergone gelatinous or mucoid degeneration. The site most commonly involved are those of the stomach, intestines and at times the breast. The tumor appears on gross inspection to be soft, shiny, and jelly-like. The cellular picture shows cells that are swollen with clear mucinous material which later destroys the cell.

(2) Anaplastic Carcinoma.

This group is discussed by Ewing under the term of "diffuse carcinoma". In this type of carcinoma "the cells lose their specific features, all trace of polarity and capacity to excite connective tissue reaction, and they grow diffusely, presenting no trace of alveolar formation. Such structures may be designated as diffuse carcinoma."[1] An example of this growth is seen in the embryonal carcinoma of the testis. According to Ewing this tumor of the testis is a one-sided development of a teratoma.

Fig.29. Embryonal Carcinoma of the Testis.

The tumor appears soft, homogeneous and necrotic in Figure 29. The normal tissue of the testis has been destroyed. The growth is usually larger than that shown here and is accompanied by hemorrhage, ulceration or suppuration.

[1] Ewing, Op.Cit., p. 510.

The cells are arranged in sheets, are round and polyhedral in shape and have hyperchromatic nuclei. There are large numbers of lymphocytes present in the tumor pictured in Figure 30. Mistaken diagnoses of lymphosarcoma are often made because of this lymphocytic infiltration. The lymphocites are scattered diffusely among the tumor cells and are accompanied by a fine stroma.

Fig.30. Embryonal Carcinoma of the Testis.

Lymphatic invasion is the most frequent method of metastasis. Blood stream involvement comes later. The tumor is rapidly growing and early metastases are found in the abdominal nodes, lungs, brain, liver, kidney and stomach.

This tumor is a teratoma of the testis. Ewing gives three varieties of teratoma testis. They are (1) adult embryomas or teratomas, (2) embryoid, teratoid or mixed tumors, and (3) the embryonal malignant tumors. The tumor

discussed on page 49 belongs to the last group. Figure 31 is a photograph of two tumors of the testis.

Fig.31. Teratoma Testis.
A. Adenocarcinoma of the Testis.
B. Dermoid Cyst, Teratoma of Testis.

The upper one is an adenocarcinoma belonging to Ewing's third group of teratomas. The lower tumor is diagnosed as a dermoid cyst and is an example of the teratoid or mixed tumors of the testis.

The adenocarcinoma presents an encapsulated appearance and is hemorrhagic, soft and friable. The size of the testis is not remarkably increased. Microscopically the tumor presents irregular alveoli and characteristic

cells. (Figure 32) The neoplastic cells are cuboidal,

Fig.32. Adenocarcinoma of the Testis.

small and contain large hyperchromatic nuclei. Lymphocytic infiltration is marked.

The teratoma or dermoid cyst pictured in Figure 33

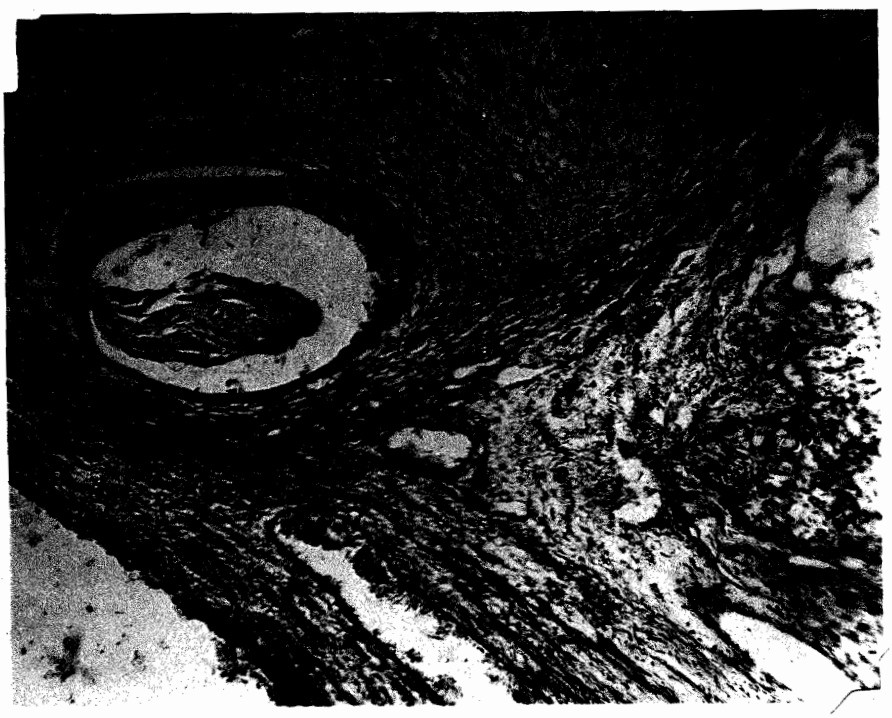


Fig.33. Teratoma Testis - Dermoid Cyst.

shows a greatly enlarged testis which is filled with a friable soft mass. The testicular tissue is stretched tightly over the tumor. A section taken from this tumor shows a cyst lined by epithelial cells. Just below the cyst is a gland-like structure lined by typical gland cells. The nuclei are small and hyperchromatic. The solid portions of the tumor show increased connective tissue and myxomatous tissue.

(3) Pseudomucinous Cystadenoma of the Ovary.

This tumor is usually benign, but occasionally it becomes malignant. When malignant, Ewing designates it as a "pseudomucinous adenocarcinoma". The ovary is greatly enlarged and on cross section shows a multilocular structure and thin walls. The contents are firm, soft and gelatinous or are a mucinous fluid.

The tumor pictured in Figure 34 shows only one area

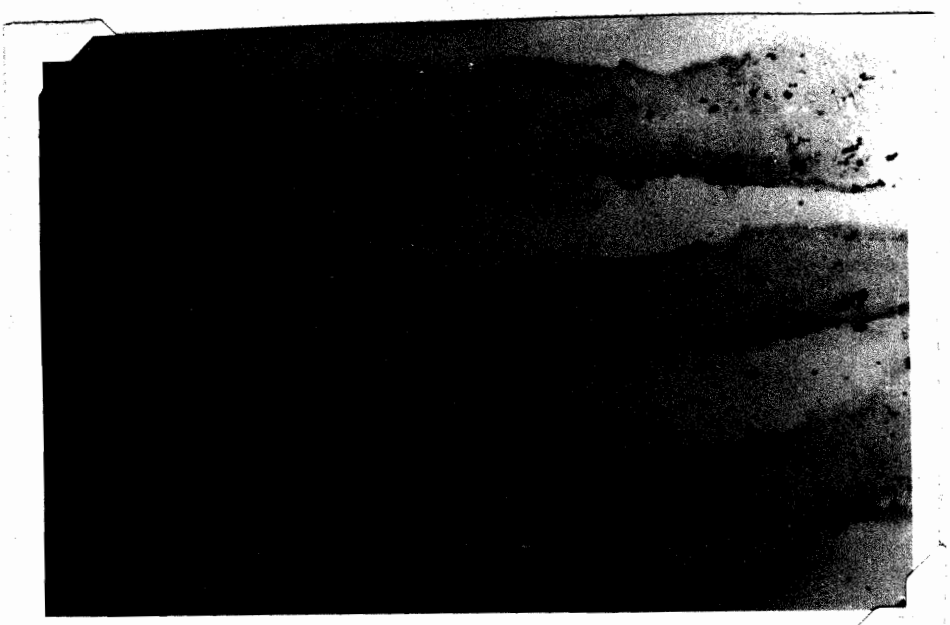


Fig.34. Pseudomucinous Cystadenoma of the Ovary.

that appears malignant. The cells are several layers deep, are granular and have hyperchromatic nuclei. Otherwise the tumor shows the usual benign picture. The septa branching from the solid portion of the tumor are thin, vascular and are lined by a single layer of tall columnar cells. The nuclei are at the base of the cell. The cytoplasm is clear and homogeneous.

CHAPTER VI

SPECIAL FORMS OF EPITHELIAL TUMORS

A. Hypernephroma:

Recognition of this tumor is made easy by the gross appearance. The tumor attacks usually the upper or lower poles of the kidney, and leaves an uninvolved portion of normal renal tissue. At first the tumor mass is encapsulated, but in more advanced stages invasion of surrounding tissue occurs, the tumor grows and a large fungating mass is seen. The colors seen in the tumor are striking. The growth is yellow and has many large red hemorrhagic areas scattered through it. Cysts of all sizes are scattered throughout the tumor mass. According to Boyd there may be a fibrous core in the center of the growth.

The microscopic picture is as striking as the gross picture. The tumor cells are large, rounded and have a clear vacuolated cytoplasm. The nuclei are small. According to Boyd the tumor cells are grouped in three possible ways. "There are three possibilities, which in their order of frequency are: (1) a cystic papillary formation, in which papillary processes project into indefinite cystic spaces but with no real tubular formation; (2) an alveolar arrangement of solid cords, divided into masses by thin septa; (3) occasionally a definitely tubular arrangement

which irresistibly suggests that the tumor is of renal origin."[1] The arrangement seen below is that given in the second group; an alveolar grouping of cells into solid cords.

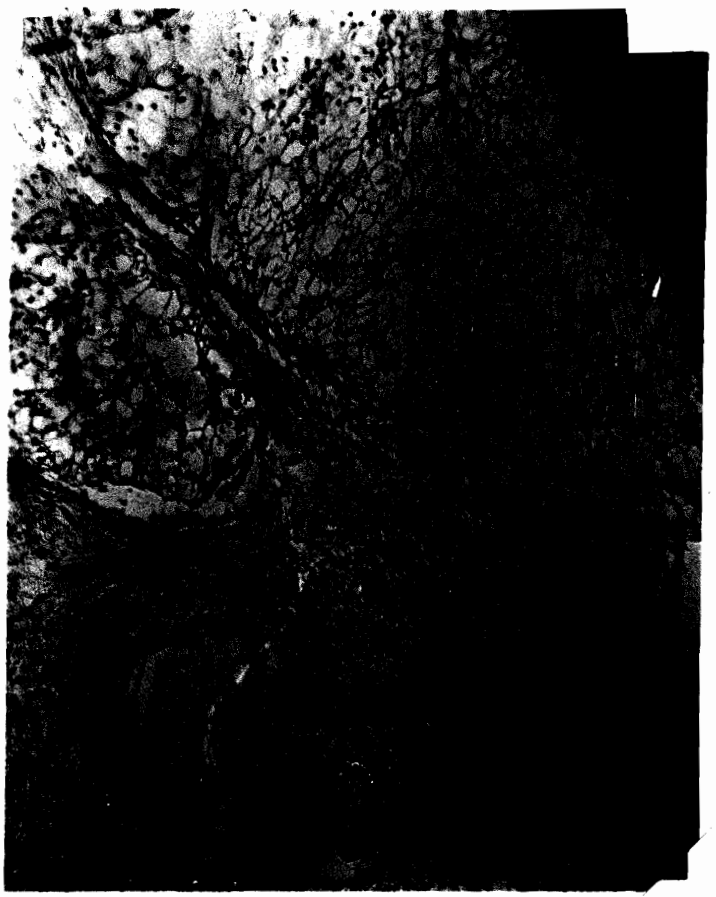


Fig.35. Hypernephroma of the Kidney.

The stroma can be seen only as thin septa separating two groups of clear vacuolated tumor cells. In the lower left-hand corner a third group of cells is forming. Notice the glomerulus that has been practically destroyed. Ordinarily thin-walled blood vessels are numerous. In this section

[1] Boyd, Op.Cit., p. 579.

there are not many to be seen. However, a few can be found in the septum separating the tumor cells. These cells often seem to be forming the vessel wall, and it is not surprising to find many hemorrhages.

As soon as the fibrous capsule surrounding the growing tumor breaks direct invasion of kidney tissue occurs. The renal and portal veins are then invaded and metastases become widespread. As a result of spread by way of the blood stream the lungs and bones are most often involved, although the liver is not an uncommon site. Metastasis may occur by way of the lymphatics with resulting involvement of regional lymphnodes.

The main characteristics to be remembered here are those of:

1. A variegated gross appearance showing large red hemorrhagic areas in a yellow cystic growth.
2. Large round clear cells.
3. Three types of cell grouping:
   (a) Cystic papillary formation.
   (b) Alveolar arrangement.
   (c) Tubular arrangement.
4. Presence of numerous large blood vessels in the thin septa.
5. Metastasis by way of the blood stream, direct invasion and lymphatics as soon as the capsule surrounding the tumor ruptures.

B. Chorionepithelioma:

This tumor arises from fetal tissue in the uterus and is highly malignant. It is usually found in the fundus and is relatively small. The growth pictured here has resulted in such extensive metastases that the tissues are densely adherent and can scarcely be distinguished. It can be seen, however, that the uterus is not remarkably increased in size.

Fig.36. Chorionepithelioma of the Uterus Showing Marked Involvement of the Intestines and All Surrounding Tissue.

The primary tumor is larger than one would expect. Instead of being compact it appears rather friable and fungating. There has been definite infiltration of adjacent uterine tissue. The tumor is soft, bright red in color and projects into the uterine canal. The evidence of hemorrhage is marked.

Figure 37, a secondary chorionepithelioma of the lung, shows the same gross appearance seen in the primary tumor. The lung is diffusely spotted with bright red hemorrhagic tumor masses. These secondary growths may be seen in the photograph, but the amount of differentiation between the malignant and normal lung tissue can't be made out to any great extant.

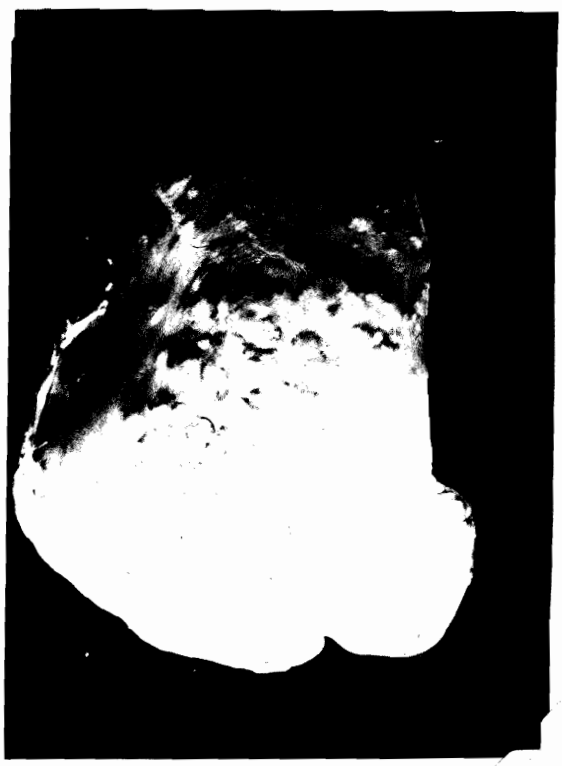


Fig.37. Secondary Chorionepithelioma of the Lung.

This tumor arises from the trophoblast which normally is made up of two types of cells. There is an outer layer of dark-staining cells, the syncytial cells, and an inner mass of clear cells with large pale nuclei. These are known as Langhans cells, and in the usual course of the tumor it

is these that carry on the destruction of tissue. In more differentiated, less malignant tumors, the syncytial cells are more prominent. In view of the extensive invasion and metastases of the tumor pictured above and the evident malignancy, the microscopic picture on section of the tumor is puzzling. Figure 38, a section taken from the primary growth in the uterus, shows compact Langhan's cells enclosed by syncytial cells. The syncytial cells appear hyperchromatic and, in places, invasive. The microphotograph of the section taken from the secondary tumor in the lung shows a tumor made up of small dark-staining cells. There are a few clear cells and many lymphocytes. The tumor is definitely a syncytial cell type of chorionepithelioma.

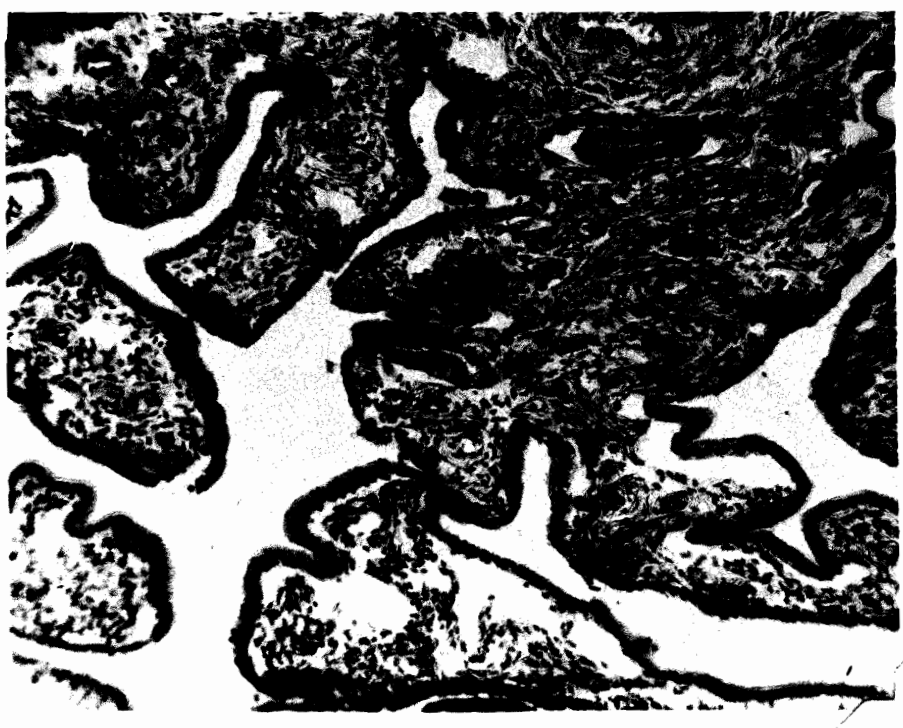


Fig.38. Primary Chorionepithelioma of the Uterus.

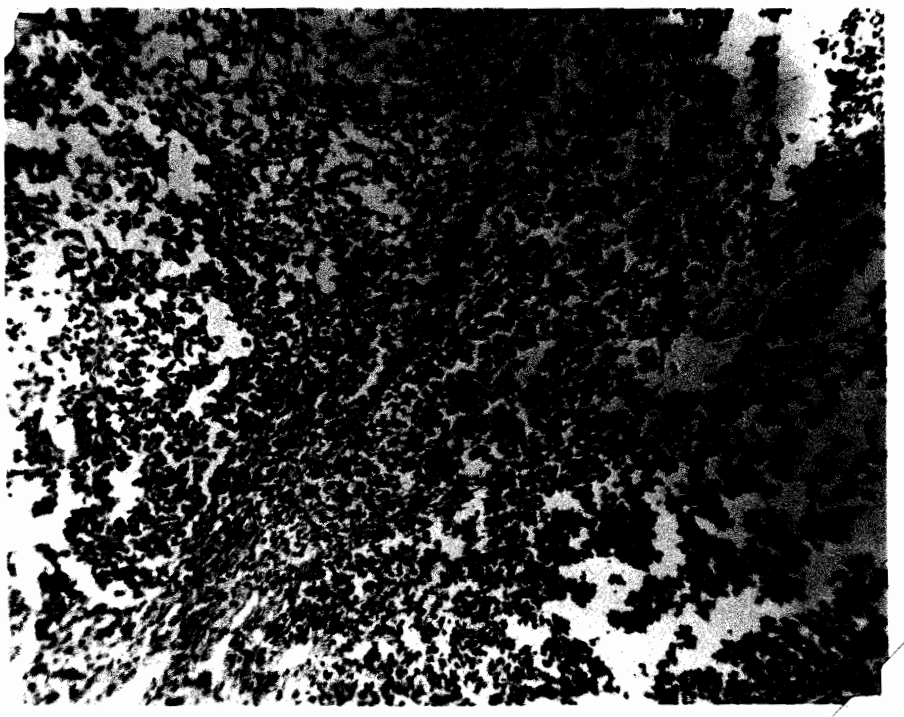


Fig.39. Secondary Chorionepithelioma of the Lung.

Metastasis takes place by way of the blood stream and is usually extensive. In the tumor pictured on page 57 metastasis occurred in the vagina, intestines, liver and lung.

Important points to remember here are:

1. A small opaque infiltration tumor appearing in the placental site, the fundus of the uterus.
2. The marked hemorrhagic appearance of both primary and secondary tumors.
3. Large number of Langhan's cells which are clear, cubical, have large, pale nuclei, and show mitotic figures.

4. Syncytial cells which are large, dark multinucleated and are present in small groups.
5. Metastasis by way of the blood stream and direct invasion.

The gliomas and endotheliomas have been left out of this description of malignancies. There were too few cases found in the ten year period covered by the survey (there were two gliomas and four endotheliomas) and their malignancy is too variable to cause them to be considered here where only the malignant tumors encountered in the survey are described.

PART II

STATISTICAL ANALYSIS OF CANCER
AS REVEALED IN A SURVEY OF SALT LAKE CITY HOSPITALS
1925-1934 INCLUSIVE

CHAPTER I

SARCOMA

1. Sex Frequency.

Relatively few cases diagnosed as sarcoma were found in the survey covering a ten year period of hospital admittances of malignant diseases. One hundred and fifty-five cases of sarcoma were found and this constituted 6.43% of all the malignant tumors studied. The relative percentages found in these cancers are shown in Table III and graph I.

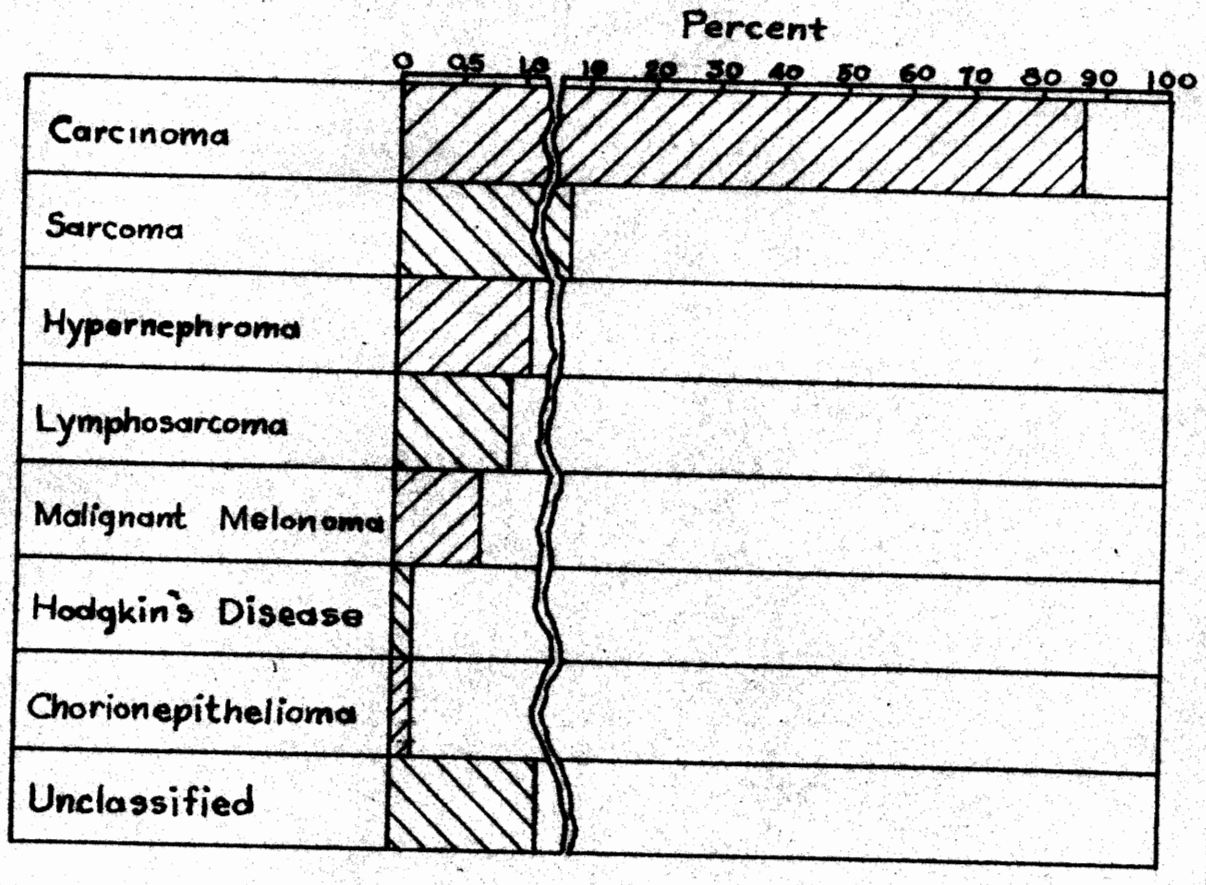
Table III (Sarcoma)
Distribution by Type of Tumor Found in 2409 Cancer Patients in a Survey of Salt Lake City Hospitals - 1925-1934 Inclusive.

Type of Malignancy	Male	Female	Total	Percentage of total
Carcinoma	947	1172	2119	87.97%
Sarcoma	84	71	155	6.43%
Hypernephroma	14	11	25	1.04%
Lymphosarcoma	12	10	22	.91%
Malignant Melanoma	8	8	16	.66%
Hodgkin's Disease	2	2	4	.17%
Chorionepithelioma	0	4	4	.17%
Unclassified	39	25	64	2.65%
Totals	1106	1303	2409	100.00%

While the number of cases is smaller than a complete statistical analysis should have, the sex variation is well brought out here. The osteogenic sarcoma is the type most frequently encountered, and in writing of these tumors, Ewing says,

GRAPH I

Percentage Distribution by Type of Malignancy of
2409 Cancer Patients Admitted to
SALT LAKE CITY HOSPITALS
1925-1934 Inclusive



"Osteogenic sarcoma is much more frequent in males than in females."[1] It was calculated from figures given in Table III that 54.19% of the sarcomas appeared in male patients, leaving a percentage of 45.81% for the female patients. Stout in his book of "Human Cancer" states that about 60% of osteogenic sarcomas occur in males. The figures given above agree fairly well with those given by Stout.

2. Age Ranges Affected in Sarcoma.

Table IV - Sarcoma.
Age Distribution in 155 Sarcoma Patients Studied In A Survey of Salt Lake Hospitals From 1925-1934 Incl.

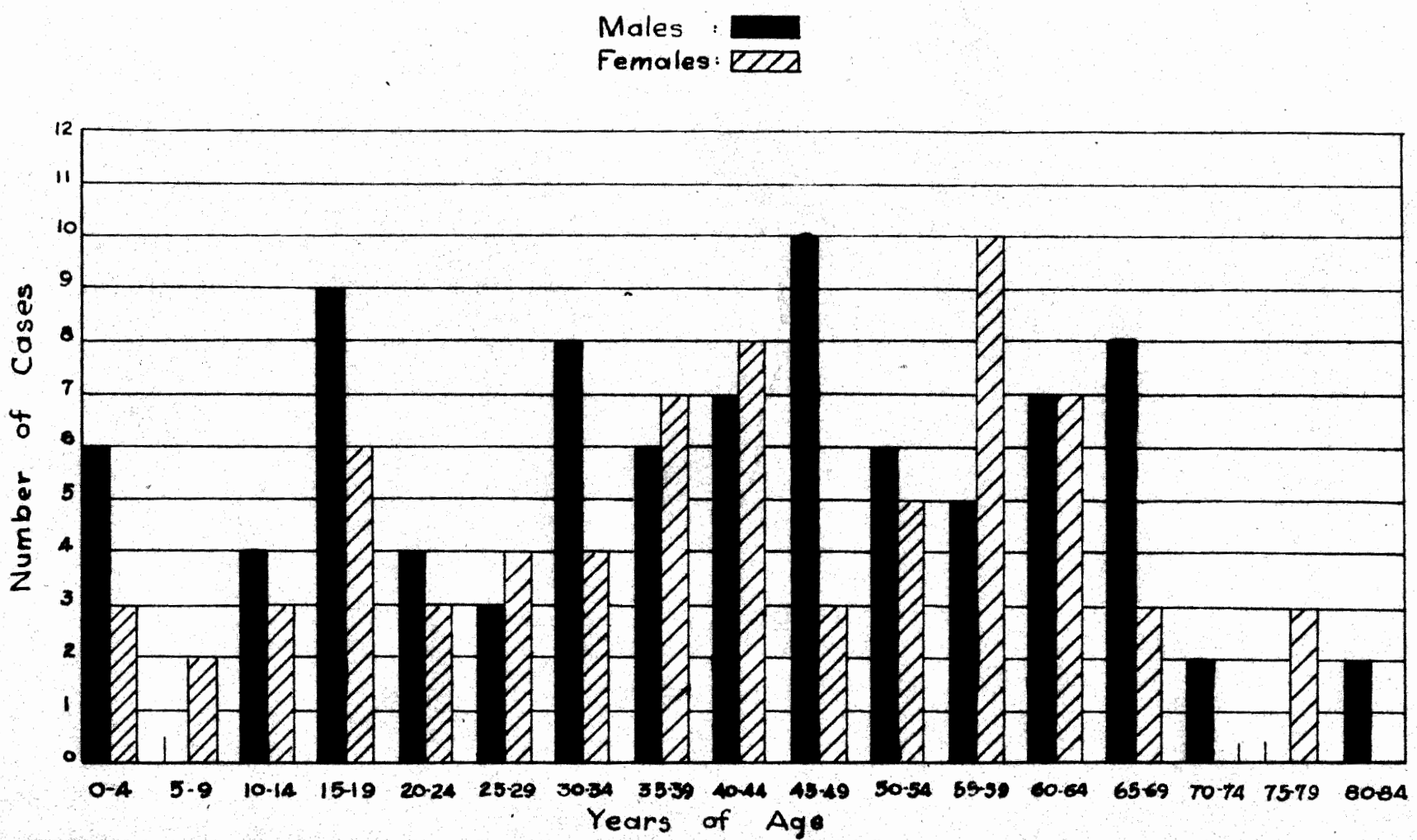
Years of Age.	Male Total	Male Percentage	Female Total	Female Percentage	Grand Total	% Of Grand Tot.
0- 4	4	4.76%	3	4.23%	7	4.52%
5- 9	-	-	2	2.82%	2	1.29%
10-14	4	4.76%	3	4.23%	7	4.52%
15-19	9	10.71%	6	8.45%	15	9.68%
20-24	4	4.76%	3	4.23%	7	4.52%
25-29	3	3.57%	4	5.63%	7	4.52%
30-34	8	9.52%	4	5.63%	12	7.74%
35-39	6	7.15%	7	9.86%	13	8.39%
40-44	7	8.34%	8	11.27%	15	9.68%
45-49	10	11.90%	3	4.23%	13	8.39%
50-54	6	7.15%	5	7.04%	11	7.96%
55-59	5	5.95%	10	14.08%	15	9.68%
60-64	7	8.34%	7	9.88%	14	9.03%
65-69	8	9.52%	3	4.23%	11	7.96%
70-74	2	2.38%	-	-	2	1.29%
75-79	-	-	3	4.23%	3	1.94%
80-84	1	1.19%	-	-	1	.65%
85-89	-	-	-	-	-	-
90-94	-	-	-	-	-	-
Totals	84	100	71	100	155	100

Considering the percentages of the grand totals, three distinct age ranges are affected. In the years of 15-19, 40-44 and 55-59, a percentage of 9.68% was found. According to Boyd the patients having osteogenic sarcoma are from ten

[1] Ewing, Op.Cit., p. 289.

GRAPH II

Age distribution among 155 cases of sarcoma studied in a survey of SALT LAKE CITY HOSPITALS 1924-1934 Inclusive



to thirty years of age. The disease is rare after fifty years. As seen from Table IV and Graph II the percentage of males from 55-59 years of age is only 5.95%, but the females show a percentage of 14.08%. As a whole the age distribution found here falls into older age groups than would be expected. However, a large percentage of both male and female is in the age group of 15-19 years. These ages were taken from the day of admittance of the patient. As a result inaccuracies occur. The tumor may have been present many years before the patient went to the hospital. Sarcoma, however, occurs in younger age groups than do other malignant tumors. It is interesting to see that 10.71% of the male patients are in the 15-19 years age group, and 8.45% of the females are in this group.

3. Death Rates in Sarcoma.

The malignancy of a sarcoma depends on a number of factors, and as a result the prognosis may vary widely. The structural type of the sarcoma, the location of the tumor, the age and condition of the patient and the rate of metastasis, all influence the end result. The younger the patient the graver the prognosis. The figures found in the survey show a high percentage of the patients dying in the hospitals; of all the patients diagnosed as having sarcoma, 25.8% die. The male patients show a correspondingly high death rate of 30.97%. As seen in Table IV, 10.71% of the male patients fall in the age group of 15-19 years. The malignancy of

Table V - Sarcoma.
Percentage Death Rates in 155 Sarcoma Cases Studied In a Survey of Salt Lake City Hospitals 1925-1934 Incl.

Patients Concerned	Male	% of Male	Female	% of Female	Total	% of Total
Patients Dying in Hospital	26	30.97	14	19.72	40	25.8
Patients Treated & Discharged from Hospital	58	69.03	57	80.28	115	74.2
Totals	84	100	71	100	155	100

the tumor is high in the younger age groups. The 19.72% of female deaths, while high, is much lower than that given for the male. These figures give just an idea of the condition. Often the malignancy was so far advanced that the patient came to the hospital for palliative treatment only and ready to die there. Other patients came with a really malignant, fast-growing sarcoma which killed despite treatment. Many were discharged to die at home. As a result these figures must be understood to mean an indication of the conditions in the hospital.

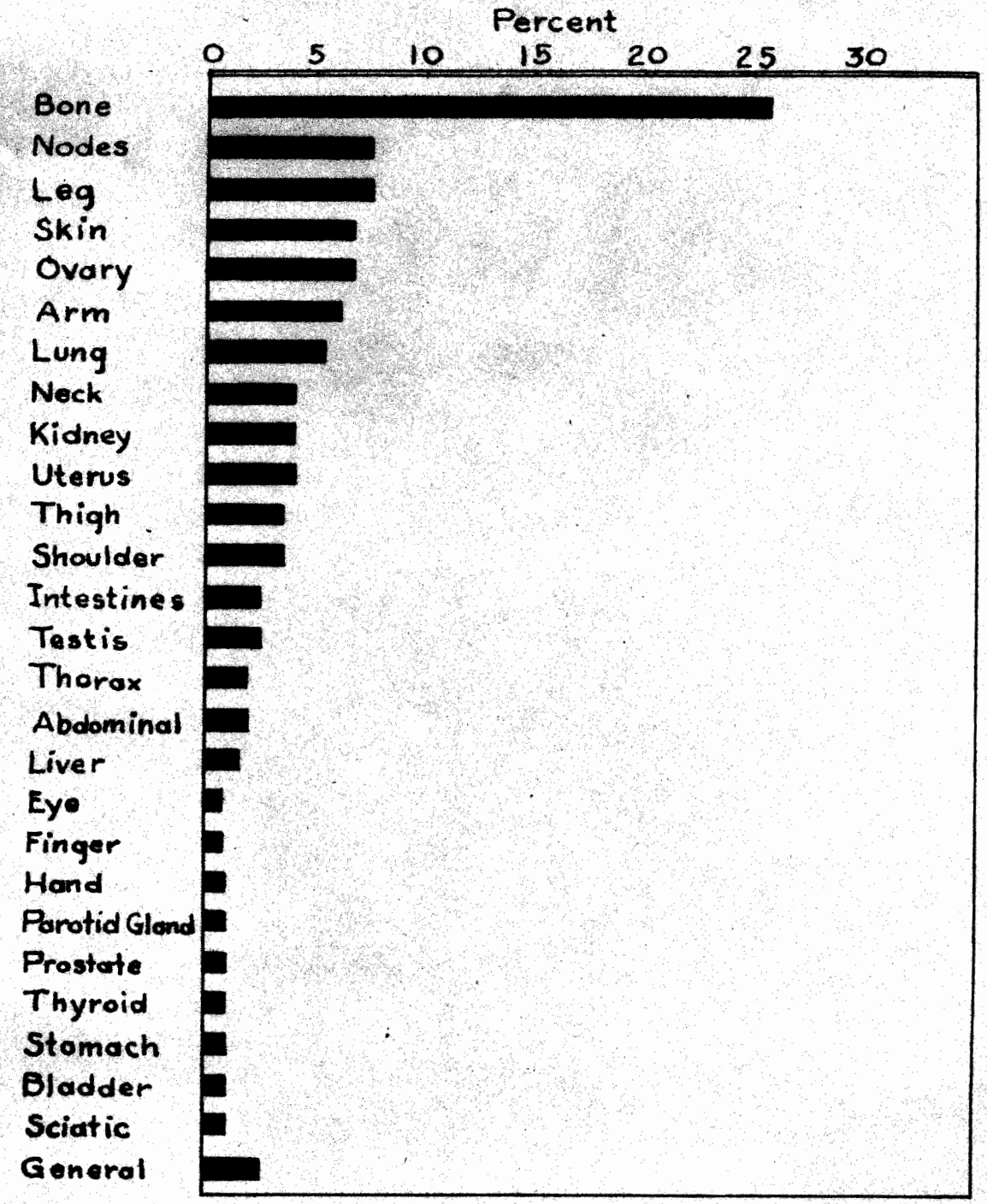
4. Sites of the Sarcoma Lesion.

Table VI - Sarcoma.
Sites of Primary Lesions of 155 Sarcoma Cases Studied in a Survey of Salt Lake City Hospitals, 1925-1934 Inclusive. Showing Percentage of Deaths by Site.

Sites of Lesion.	Patients Dying In Hospital.				Patients Treated at Hospital				Grand Total	% of Grand Total
	Male		Female		Male		Female			
	T.	%	T.	%	T.	%	T.	%		
Bone	8	30.77	1	7.14	19	32.78	12	21.05	40	25.81
Nodes	2	7.69	1	7.14	3	5.17	5	8.78	11	7.10
Leg	0	-	2	14.30	0	-	9	15.79	11	7.10
Skin	0	-	1	7.14	1	1.72	8	14.04	10	6.45
Ovary	0	-	4	28.57	0	-	6	10.55	10	6.45
Arm	0	-	0	-	5	8.63	4	7.02	9	5.80
Lung	6	23.08	0	-	2	3.45	0	-	8	4.16
Neck	2	7.69	0	-	4	6.90	0	-	6	3.86
Kidney	2	7.69	0	-	1	1.72	3	5.26	6	3.86
Uterus	0	-	4	28.57	0	-	2	3.51	6	3.86
Thigh	0	-	0	-	2	3.45	3	5.26	5	3.23
Shoulder	2	-	0	-	3	5.17	0	-	5	3.23
Intestines	1	3.85	1	7.14	2	3.45	0	-	4	2.57
Testis	1	3.85	0	-	3	5.17	0	-	4	2.57
Thorax	0	-	0	-	3	5.17	0	-	3	1.94
Abdominal	0	-	0	-	3	5.17	0	-	3	1.94
General	2	7.69	0	-	0	-	0	-	2	1.29
Liver	0	-	0	-	2	3.45	0	-	2	1.29
Eye	0	-	0	-	0	-	2	3.51	2	.65
Finger	0	-	0	-	0	-	1	1.75	1	.65
Hand	0	-	0	-	0	-	1	1.75	1	.65
Parotid Gland	0	-	0	-	0	-	1	1.75	1	.65
Prostate	0	-	0	-	1	1.72	0	-	1	.65
Thyroid	0	-	0	-	1	1.72	0	-	1	.65
Stomach	0	-	0	-	1	1.72	0	-	1	.65
Bladder	0	-	0	-	1	1.72	0	-	1	.65
Sciatic Nerve	0	-	0	-	1	1.72	0	-	1	.65
Totals	26	100	14	100	58	100	57	100	155	100

GRAPH III

Sites of Primary Lesions in 155 Sarcoma Cases
Studied in a Survey of
SALT LAKE CITY HOSPITALS
1925-1934 Inclusive



Bone, very evidently, is the most frequent site of primary sarcoma. Table VI and Graph III bear this out well. There is a large jump from the 7.10% seen for lymph nodes to 25.81% of all sarcomas which occur in bone. It is the most frequent site for both male and female. The sites listed in Table VI were taken as given in case histories and diagnosis. Sarcomas of the hand, finger, arm and thigh, etc., were diagnosed as such and were listed accordingly. From the records it could not be determined whether the bone or the muscles was primarily involved. The male patient again predominates in both death rate and number of patients treated. Of all male patients dying in the hospital from sarcoma, 30.72% died from sarcoma of the bone, and 32.78% of all male patients having sarcoma and treated in the hospital had a diagnosis of sarcoma of bone. The female percentages vary to a slight extent. Of all the females treated in the hospitals for sarcoma 21.05% had sarcoma of the bone, which is the most frequent site for this tumor. However, the death percentage is only 7.14%, while it rises to 28.57% for sarcoma of both the ovary and the uterus. In both instances there were only four cases, but with relation to the other sites, the percentages are remarkably high. Sarcoma of both the ovary and uterus is relatively rare. It is unusual when a primary sarcoma of the lung is found, and in practically all lung cases the tumor is really an anaplastic carcinoma. In this survey

eight male patients were diagnosed as having sarcoma of the lung; six of these men died in the hospital. All authors agree on the difficulty of diagnosing primary sarcoma of the lung and of differentiating it from anaplastic carcinoma. Sarcoma of the lung is rare in both male and female and errors in diagnosis may account for the high percentage of 25.08% seen in males dying of primary sarcoma of the lung. The apparent scarcity of "sarcoma" of the lung in the female might be explained by environmental and occupational factors.

5. Types of Treatment Used for the Sarcoma Patient.

Table VII - Sarcoma.
Types of Treatment Used for 155 Sarcoma Patients Found In a Survey of Salt Lake Hospitals, 1925-1934 Inclusive.

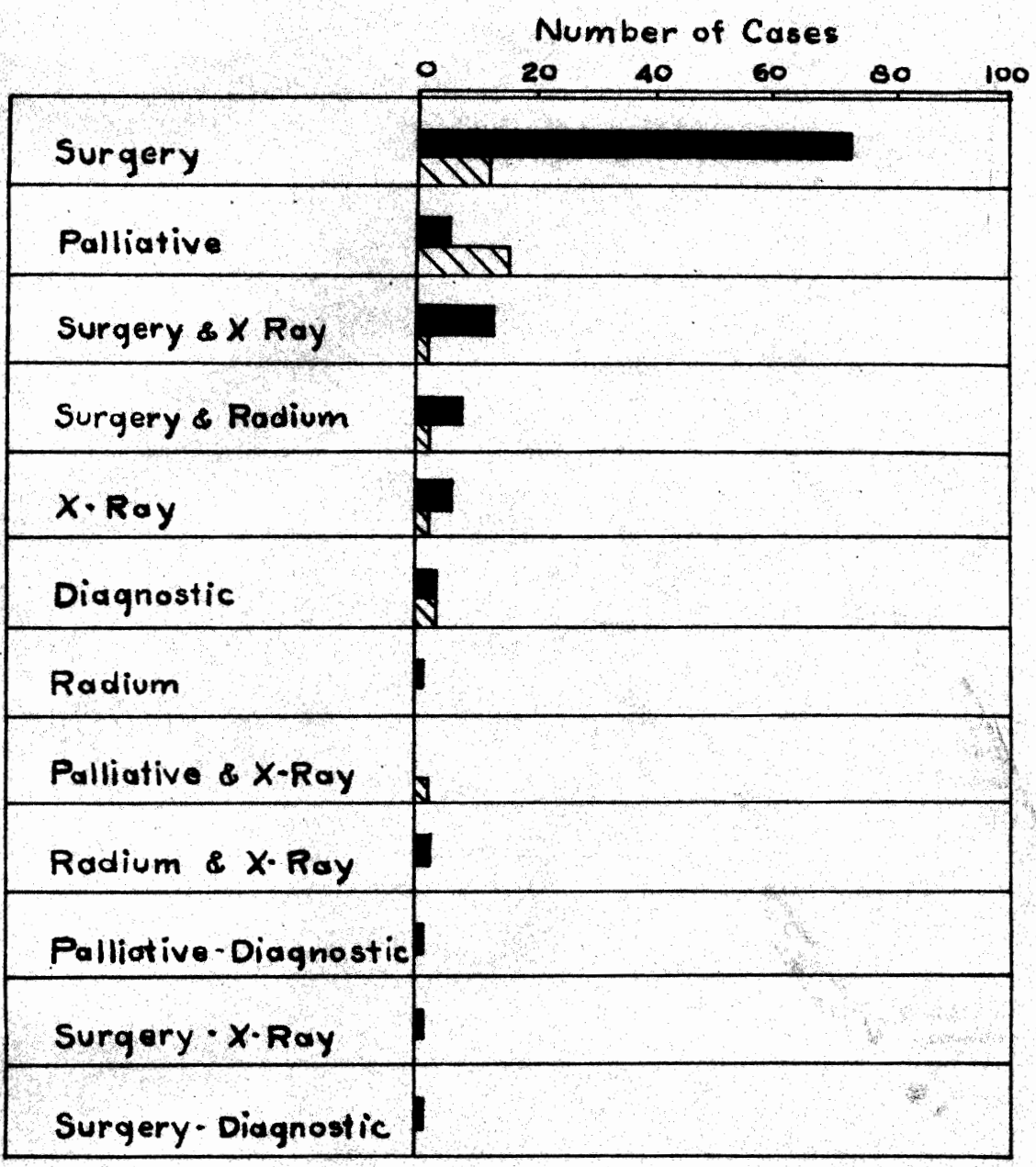
	Patients Dying in the Hospital				Patients Treated & Discharged				Gr.	% of Gr.
	Male		Female		Male		Female			
Treatment	T.	%	T.	%	T.	%	T.	%	Tot.	Tot.
Surgery	6	25.08	6	42.86	35	58.90	39	68.42	84	54.18
Palliative	12	46.15	5	35.72	2	3.45	3	5.27	22	14.19
Surgery-X-ray	1	3.85	1	7.14	9	15.52	5	8.77	16	10.32
Surgery-radium	1	3.85	1	7.14	5	8.62	3	5.27	10	6.45
X-ray	1	3.85	1	7.14	5	8.62	0	-	7	4.52
Diagnostic	3	11.54	0	-	2	3.45	1	1.75	6	3.87
Radium	0	-	0	-	1	1.72	2	3.51	3	1.94
Palliative X-ray	2	7.68	0	-	0	-	0	-	2	1.29
Radium X-ray	0	-	0	-	0	-	2	3.51	2	1.29
Pallia.Diag.	0	-	0	-	0	-	1	1.75	1	.65
Surg.-Ra.-X-ray	0	-	0	-	1	1.72	0	-	1	.65
Surgery-diag.	0	-	0	-	0	-	1	1.75	1	.65
Totals	25	100	14	100	58	100	57	100	155	100

Surgery plays the most important role here as it does in nearly all cases of malignant tumors. Of all the sarcomata, 54.18% were treated surgically. In only one case did surgical treatment take a second place and that was in palliative treatment. Of all male patients dying in the hospitals 46.15% were

GRAPH IV

Types of Treatment Used for 155 Cases of Sarcoma
Studied in a Survey of
SALT LAKE CITY HOSPITALS
1925-1934 - Inclusive

Patients Treated and Discharged from the Hospitals : ■
Patients Dying in the Hospitals : ▨



treated palliatively and 23.08% were treated surgically. The females dying show 35.72% under palliative treatment and 42.86% under surgical treatment. Many patients enter the hospital with the malignancy so far advanced that little can be done other than to make them as comfortable as possible. As would be expected the death rate in cases treated this way is high, since this form of therapy exerts no special effect upon the particular neoplasm or its consequences. Of all the cases of sarcoma palliative treatment was second in frequency with a percentage of 14.19%. Graph IV illustrates these ratios between patients dying in the hospital and those discharged.

A large percentage of the males dying had no definite type of treatment and were in the hospital for diagnosis only. This diagnostic treatment includes clinical, roentgenological and biopsy findings. In these cases there was no history of treatment other than to make a diagnosis, after which the patient died or was discharged. This type of treatment shows 3.87% of all the types listed. It is significant to notice the large percentage (11.54%) of males dying that were in the hospitals for diagnosis. Case histories again show the negligence of the patient in seeking treatment for a growth which in many cases had been present and growing for three or four years.

Surgery combined with X-ray radiation constitutes the relatively large percentage of 10.32% of the treatment used.

According to Stout radical surgical removal is the treatment of choice, but Ewing claims that, if possible and successful, radiation should be tried first. He justifies this in that from manipulation of the tumor cell-emboli occur and early metastasis results. Many sarcomas are very susceptible to radiation and the duration of life may be definitely prolonged. Even if the growth is radio-resistant, enough of the tumor cells are devitalized to render a more successful operation with less danger of metastasis. Ewing, however, advocates radical surgery if a biopsy shows a very malignant sarcoma.

6. Occupational Frequency.

The occupational classification used on page 8 includes only the male sarcoma patients. Case histories of the female patients gave practically only the occupations of housewife and home and frequently no occupation at all. The occupations are those by which the patient was employed at the time of admission to the hospital, and not when the tumor was first noticed. Notice the large percentage of patients (13.13%) having no occupation indicated. The hospital records were not complete with regard to this factor. These factors are well shown in Graph V.

The occupational group most frequently affected is that of the farm operators and laborers. They account for 16.16% of all sarcomas. The patients coming to Salt Lake City hospitals are drawn mainly from Utah, Nevada, Idaho and Wyoming. All of these states have a large agricultural popula-

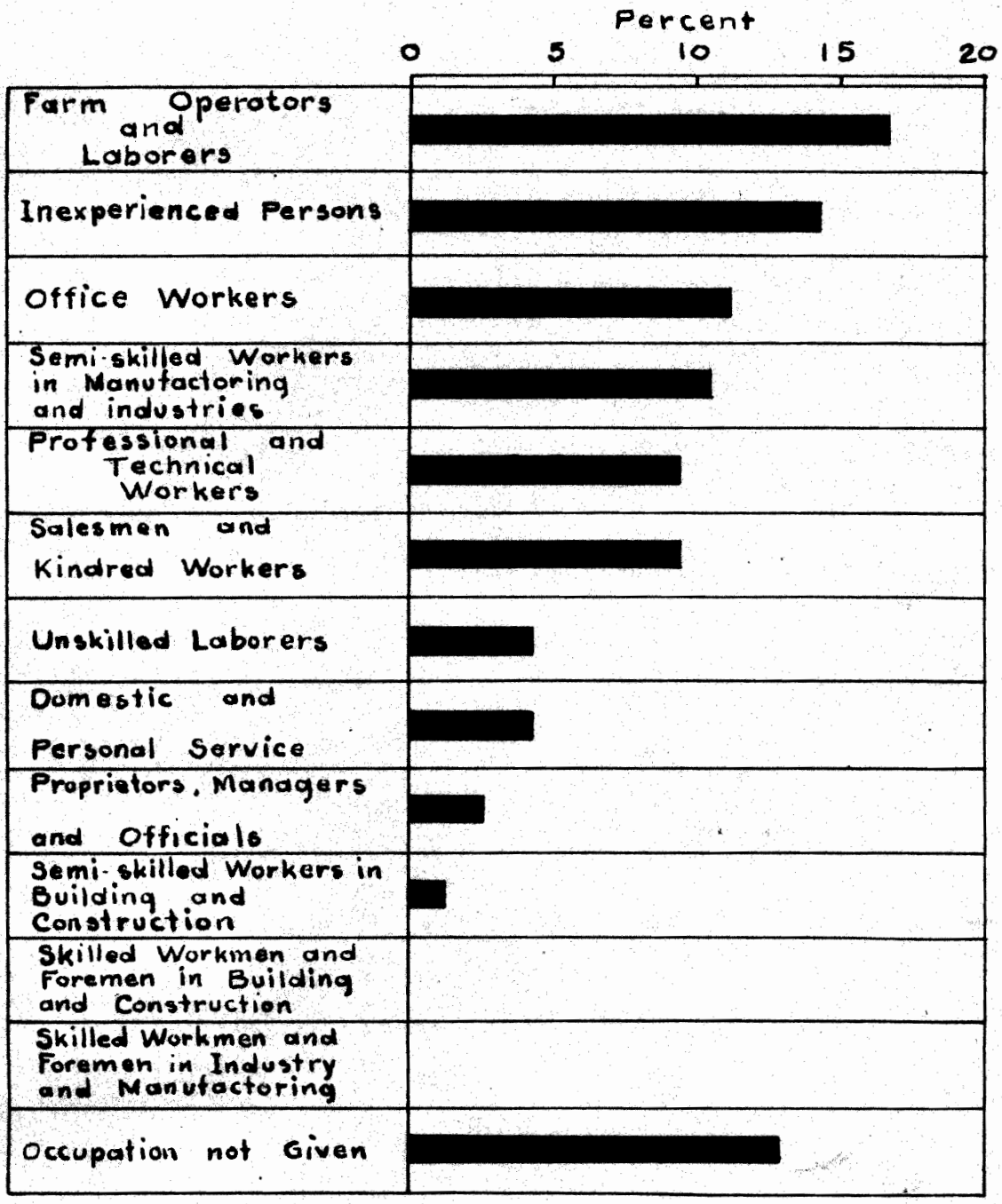
Table VIII - Sarcoma.
Occupational Frequency As Seen in 84 Sarcoma Cases of Male Patients Studied in a Survey of Salt Lake City Hospitals, 1925-1934 Inclusive.

Occupation	Total	Percentage of Total
Farm Operators and Laborers	14	16.66
Inexperienced Persons	12	14.28
Office Workers	10	11.90
Semi-Skilled Workers in Manufacturing and Industries	9	10.71
Professional & Technical Workers	8	9.52
Salesmen and Kindred Workers	8	9.52
Unskilled Workers	4	4.76
Domestic and Personal Service	4	4.76
Proprietors, Managers & Officials	3	3.57
Semi-Skilled Workers in Building and Construction	1	1.19
Skilled Workmen & Foremen in Manufacturing & Industries	0	-
Skilled Workmen & Foremen in Building & Construction	0	-
Occupation Not Given	11	13.13
Totals	84	100

tion. As a result the majority of the patients fall into this group. An etiological factor may be drawn from this. Farm laborers are exposed a large part of the time to wind, sun and irritating dusts. These factors may help to account for the large percentage of males dying of sarcoma of the

GRAPH V

Occupational Distribution Among 84 Cases of Male Sarcoma Patients Studied in a survey of SALT LAKE CITY HOSPITALS 1925-1934 Inclusive



lung. Table VI shows 23.08% of the males dying in the hospitals die of sarcoma of the lung. It must be remembered, however, that the diagnosis of primary sarcoma of the lung is a difficult and debatable one. In practically all lung cases the tumor is in reality an anaplastic carcinoma.

The group of "Inexperienced Persons" shows that 14.28% of the males fall here. This group consists of all children, high school and college students and others who had had no occupational experience. A young age group is represented here, and it is interesting to see such a high percentage. It will be remembered that the age group of 15-19 ranked high in Table IV. The males showed that 10.71% fell into this age range and was exceeded only by the group of 45-49 with a percentage of 11.9%. The age group showed 8.45% of the females afflicted were from fifteen to twenty years of age. This percentage was fifth in the rate of frequency of age group affected among females. Sarcoma not infrequently affects the younger patient, and it is not surprising to see a high percentage of patients in this occupational group.

Office workers, usually a large occupational group, show 11.9% having sarcoma. The semi-skilled workers in manufacturing and industries include miners. This class constitutes a large portion of the population and therefore a similar proportion of the hospital admittances. Here it shows that 10.71% have sarcoma. These people are more ex-

posed to such etiologic factors as trauma and irritation. Sarcoma is not a respector of occupation. As seen in Table VIII Professional and Technical Workers show 9.52%; there were no cases in the skilled labor and foremen in either manufacturing and industry or building and construction.

7. Etiological Factors.

In order to include every possible contributing cause in cancerous growths the data were tabulated under four heads, namely: precancerous lesions, hereditary factors, injury or trauma and chronic irritation. The term "precancerous" is well defined by Stout: "If all human disease is surveyed with this thought in mind, it is possible to select a great many lesions associated with cellular hyperplasia. Some of these also have been focuses of origin for cancers. Such lesions are spoken of as "precancerous."[1] Conditions showing such cellular hyperplasia and included under the term "precancerous" are those of ulcers and leukoplakia of the tongue, cervical erosion and laceration as seen in cancer of the cervix uteri, ulcers of the skin, senile keratoses, pigmented moles, ulcer of the stomach, papillomata of the large intestine and chronic mastitis.

Under the heading "Injury or trauma" were included mechanical injuries, which were followed within a reasonable length of time by a malignant growth. Ewing claims that

---

[1]Stout, Op.Cit. p. 18.

the trauma must be associated with predisposing factors: "When one or several of them meet with certain obscure predisposing conditions we have a somewhat satisfactory explanation of the facts observed regarding the relation of trauma to tumors."[1] These predisposing factors are those of: (1) the presence of a minute tumor before the injury; (2) a precancerous condition; (3) misplaced and undeveloped organs; (4) aberrant quiescent cell groups; and (5) some underlying anatomical predisposition. So far as was possible these factors were checked and associated with the injury.

The term "chronic irritation" includes such factors as jagged teeth, habitual pipe smokers, occupational factors such as cancers of the skin seen so often in X-ray workers, paraffin and aniline dye workers, cholelithiasis and chronic infections. All of these terms were made as comprehensive as possible in order not to exclude any possible factor.

Table IX and Graph VI give the incidence in the various etiological factors. The case histories were unusually incomplete with regard to the patients past history. Of all the 155 cases of sarcoma 68.39% had incomplete histories and no indication of any possible cause. Many cancers develop more or less spontaneously and can be traced to no definite etiologic factor. As a rule the histories of the patients' parents, general family and personal histories were often left blank or were the merest possible sketch

[1] Ewing, Op.Cit. p. 116.

of the present illness and physical examination.

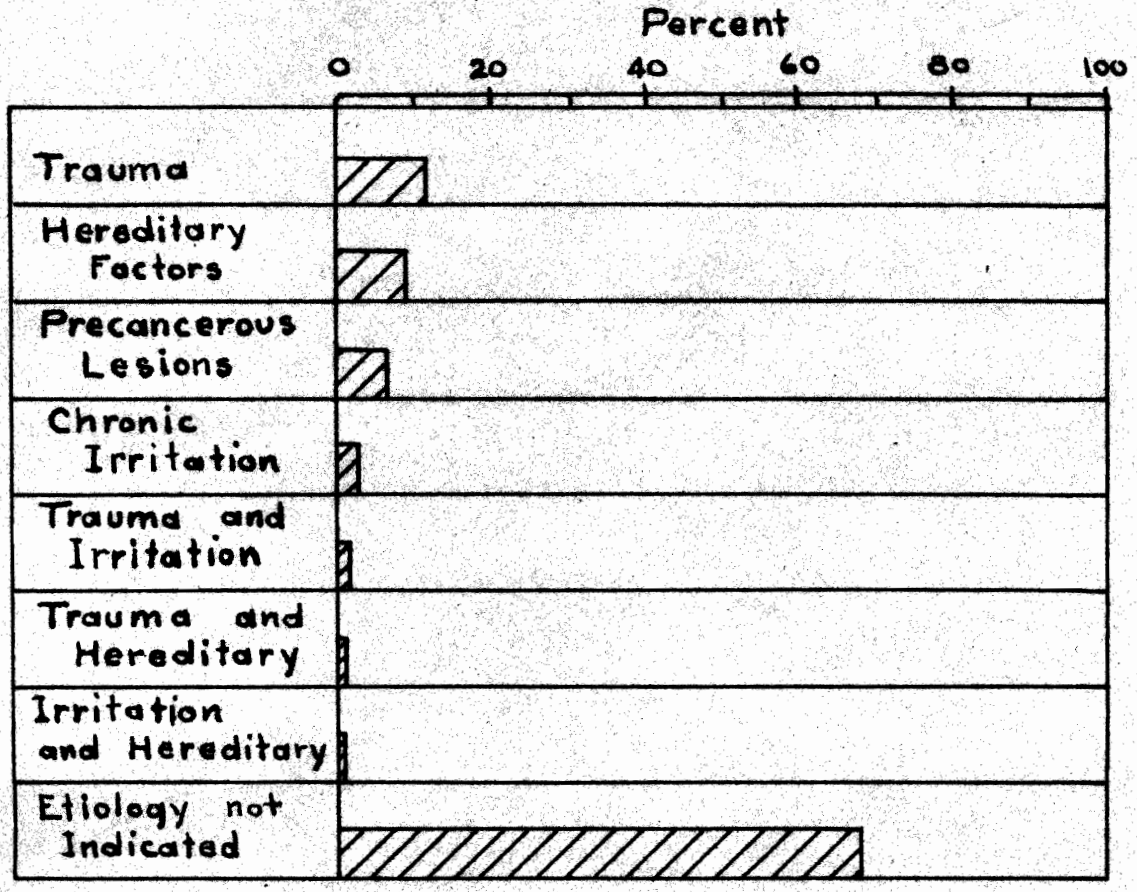
Table IX - Sarcoma.
Etiological Factors Seen in 155 Sarcoma Patients Studied in a Survey made of Salt Lake Hospitals, 1925-1934 Inclusive.

Etiological Factors	Male		Female		Grand Total	% of Grand T.
	Tot.	% of T.	Tot.	% of T.		
Trauma	12	14.29	6	8.45	18	11.61
Heredity	6	7.14	7	9.86	13	8.39
Precancerous Lesions	7	8.33	4	5.63	11	7.10
Chronic Irritation	2	2.38	1	1.41	3	1.94
Trauma and Irritation	2	2.38	0	-	2	1.29
Trauma and Heredity	0	-	1	1.41	1	.64
Irritation & Heredity	1	1.19	0	-	1	.64
Not Indicated	54	64.29	52	73.24	106	68.39
Totals	84	100	71	100	155	100

Trauma is the most frequently indicated cause of sarcoma. Here it constitutes 11.61% of all factors provoking these tumors. Sarcoma of the bone is frequently traced to an injury and as was seen in Table VI, 25.81% of the tumors involved bone. The bone sarcomas were so much more prevalent than other sites that it is not surprising to find trauma at the top of the list. Hereditary factors show a percentage of 8.39%. This is relatively high and would indicate that hereditary predisposition is a definite etiological factor. Precancerous lesions are not often present

GRAPH VI

Etiologic Factors Seen in 155 Sarcoma Patients
Studied in a Survey of
SALT LAKE CITY HOSPITALS
1925-1934 - Inclusive



in sarcomas and here they show only 7.10%. Chronic irritation is etiologic in but 1.94% of the tumors.

CHAPTER II

CARCINOMA.

---

1. Sex Frequency.

Table X - Carcinoma.
Sex Distribution As Seen in 2119 Cases of Carcinoma Studied in a Survey of Salt Lake Hospitals, 1925-1934 Inclusive.

Sex	Patients treated & discharged from Hosp.	Patients dying in Hospital.	Total	Percent of Total
Female	939	233	1172	55.31%
Male	603	344	947	44.69%
Totals	1542	577	2119	100%

In contrast to sarcoma where the male predominates, the females claim 55.31% of all the carcinomas. As will be shown under the sites involved by this type of tumor, carcinoma of the breast constitutes the principal site of this lesion. It is essentially a disease of females. There were also more females admitted to the hospitals than males. These two factors account for the higher percentage of females being affected with the various types of carcinoma. The percentage of males affected is 44.69%. It will be remembered that male patients showed 54.19% of all sarcomas while the females constituted 45.8%. Therefore conditions

in carcinomatous tumors exhibit just the reverse of that seen in the sarcomas. No satisfactory explanation of this can be found. There is a difference in the organs involved, and there is a sex factor in the sites. These may account for the frequency of carcinoma in females and of sarcoma in males.

2. Age Distribution of Carcinoma.

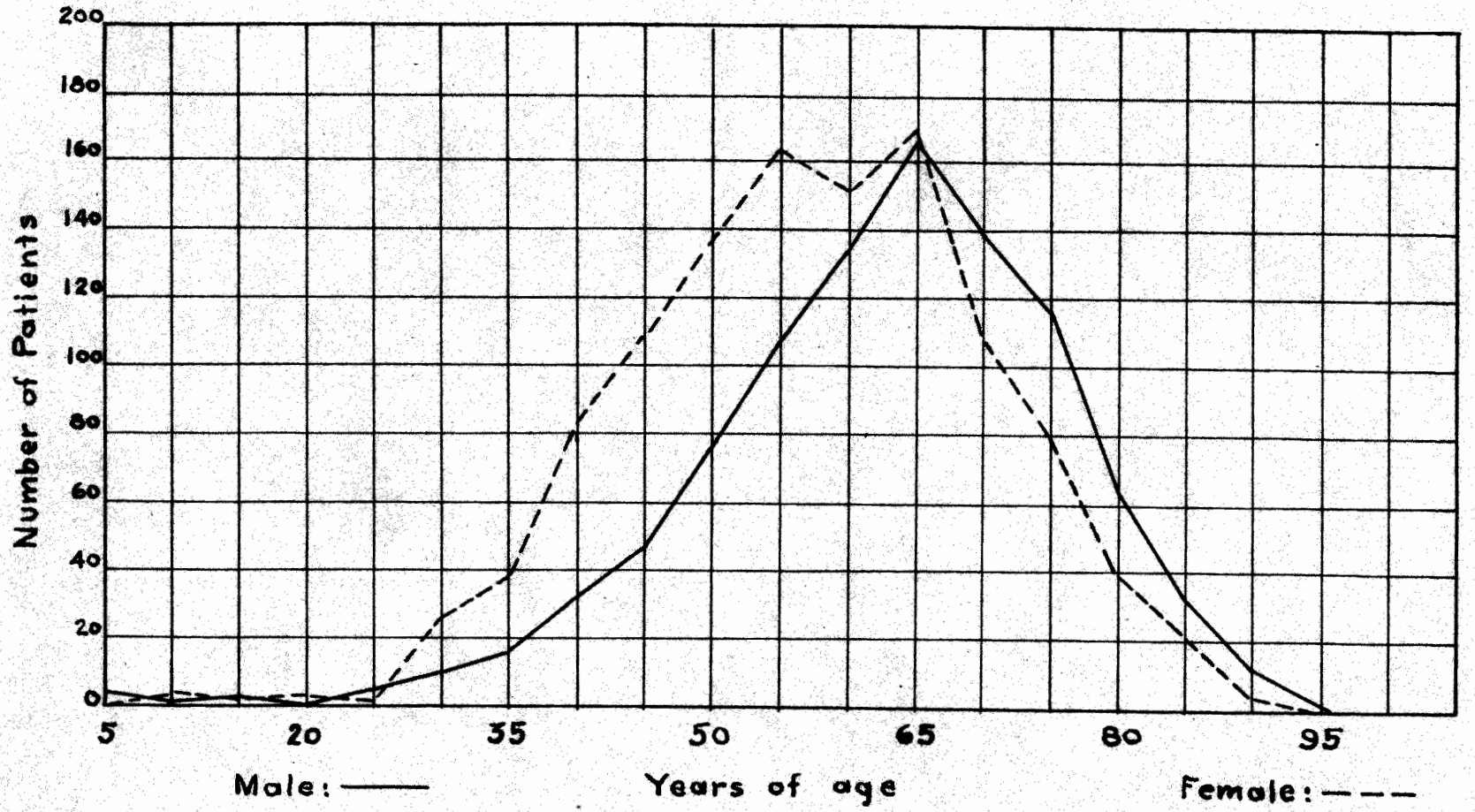
Table XI - Carcinoma.
Age Distribution of 2119 Carcinoma Patients Studied in a Survey of Salt Lake Hospitals, 1926-1934 Inclusive.

Years of Age.	Male Tot.	Male % of T.	Female Tot.	Female % of T.	Grand Tot.	% of Grand Tot.
0- 4	4	.42	1	.08	5	.24
5- 9	0	-	2	.17	2	.09
10-14	1	.11	1	.08	2	.09
15-19	0	-	2	.17	2	.09
20-24	6	.63	4	.34	10	.47
25-29	9	.95	23	1.96	32	1.51
30-34	15	1.58	36	3.07	51	2.41
35-39	29	3.06	86	7.34	115	5.43
40-44	48	5.07	111	9.47	159	7.50
45-49	76	8.03	170	14.51	246	11.61
50-54	112	11.83	163	13.91	275	12.98
55-59	135	14.26	152	12.97	287	13.54
60-64	161	17.00	165	14.08	326	15.38
65-69	136	14.36	116	9.90	252	11.89
70-74	117	12.35	80	6.83	197	9.30
75-79	62	6.55	39	3.33	101	4.77
80-84	27	2.85	19	1.62	46	2.17
85-89	9	.95	2	.17	11	.53
90-94	0	-	0	-	0	-
Totals	947	100	1172	100	2119	100

The majority of carcinoma patients fall into the older age group as is shown in Table XI and Graph VII. There is a rather definite grouping from forty-five to seventy years of age with a high percentage falling in the sixty to sixty-

GRAPH VII

Age Distribution By Sex of 2119 Cases of Carcinoma
Studied in a Survey of
SALT LAKE CITY HOSPITALS
1925-1934 Inclusive



years of age. This group claims the majority of males and runs a close second with the forty-five to fifty age group which shows 14.51% for the females. 17% of the males fall into the sixty to sixty-four age group, while but 14.08% of the females do.

Boyd gives the following explanation for the age distribution seen in this malignancy: "Carcinoma is a disease of middle and old age, although it may occur much earlier. The reason evidently is that the carcinogenic extrinsic factor must act for a long time, probably ten or fifteen years, before it can give rise to a tumor. Sarcomas occur at an earlier age."[1] The extrinsic factors referred to above include irritation and parasites. (This theory is now discredited according to Boyd.)

The younger age groups do show a few cases of carcinoma. Children up to five years constitute .24% of all the tumors of this type. The age range of fifteen to twenty which showed such a high percentage in Sarcoma (Table IV) shows here that only .08% of the carcinomas fall into this group. From twenty years of age up the percentages increase.

The ages represented here are those given by the patients at the time of admittance to the hospitals. In the majority of the cases the tumor had been present at least a year before hospital treatment was sought.

---

[1] Boyd, Op.Cit. p. 234.

3. Death Rate.

Table XII - Carcinoma.
Mortality among 2119 Carcinoma Patients Studied in a Survey of Salt Lake Hospitals, 1925-1935 Inclusive.

Patients Concerned	Male		Female		Grand Total	% of Grand T.
	Tot.	% of T.	Tot.	% of T.		
Patients Dying in Hospital	344	36.33	233	19.89	577	27.71
Patients Treated & Discharged	603	63.67	939	80.11	1542	72.29
Totals	947	100	1172	100	2119	100

The death rate among all carcinoma patients is high. Of all the cases of this tumor studied 27.71% die in the hospital. The patients treated and discharged constitute 72.29% of the tumors. The males show a higher rate than the females. Of all males afflicted with this tumor 36.33% died in the hospital, while 19.89% of the females did likewise. When considering these percentages it must be remembered that many patients are discharged to go home to die, and a large number enter the hospital where they can be taken care of as comfortable as possible until they die. These percentages really indicate the large number of patients that do not seek treatment when the tumor is in an early stage of development. They come to the hospital with a malignancy so advanced that little can be done to relieve

them and nothing to accomplish a cure.

It is interesting to note that 80.11% of the females are discharged from the hospitals. The most frequent sites involved by carcinoma in the female are fairly accessible. Because of this, early diagnosis can be made and early treatment begun. Carcinoma of the stomach and large intestine are the sites most frequently selected by this malignancy in the male. Both are relatively inaccessible, and diagnosis and treatment are more difficult.

Table XIII and Graph VIII shows a comparison between sarcoma and carcinoma with regard to mortality similarities. There are such a few points difference in these figures that the similarity is remarkable. It seems to be generally thought that sarcoma is the more malignant of the two tumors. From the figures in this table there is very little apparent difference, and if any, carcinoma is the more malignant. Both tumors show a greater malignancy among the males than among the females.

Table XIII - Carcinoma.
Comparison of Death Rates in 2119 Cases of Carcinoma and 115 Cases of Sarcoma Studied in a Survey of Salt Lake Hospitals, 1925-1934 Inclusive.

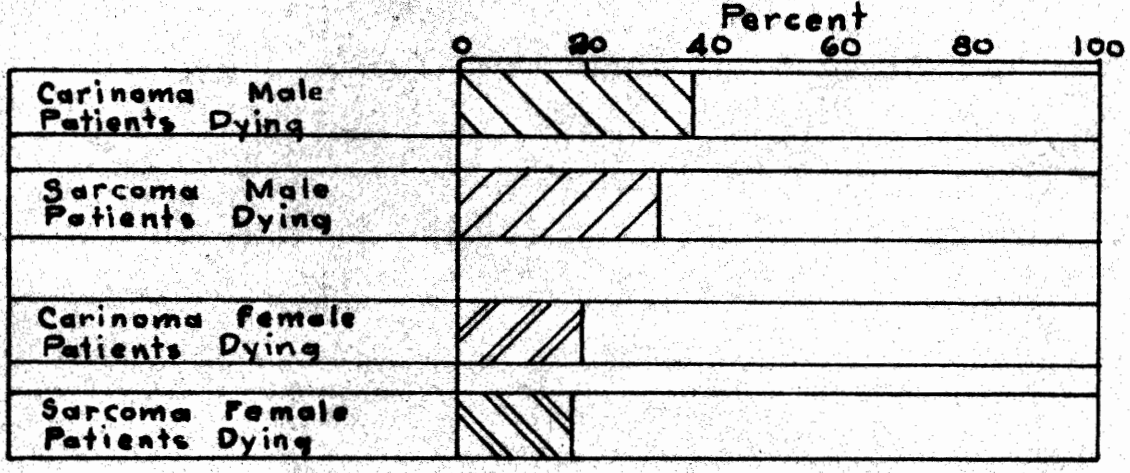
Type of Malignancy	Patients Dying in Hospitals				Patients Treated and discharged				Gr. Tot.
	Male		Female		Male		Female		
	Tot.	% of T.	Tot.	% of T.	Tot.	% of T.	Tot.	% of T.	
Carcinoma	344	36.33	233	19.89	603	63.67	939	80.11	2119
Sarcoma	26	30.97	14	19.72	58	69.03	57	80.28	155

GRAPH VIII

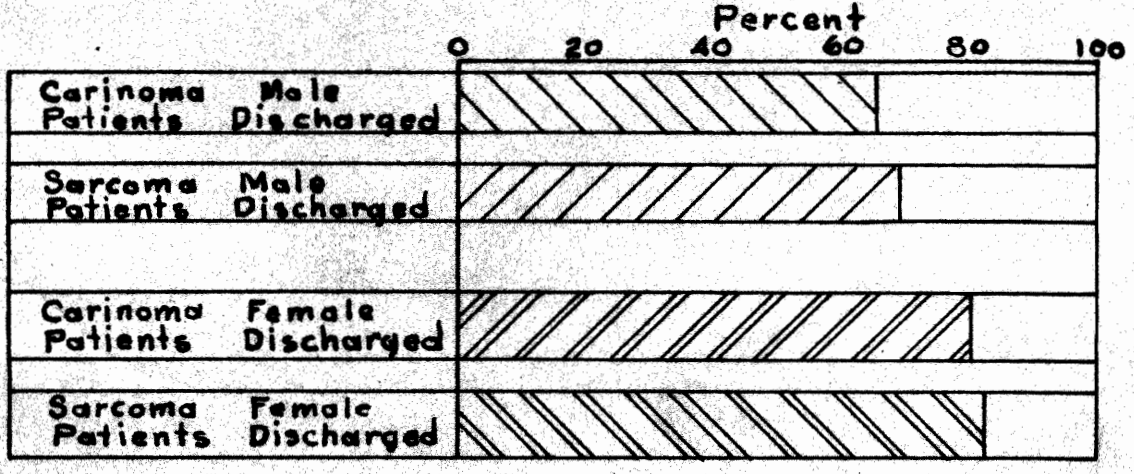
Mortality Distribution Among 2119 Carcinoma Patients and 155 Sarcoma Patients Studied in a Survey of SALT LAKE CITY HOSPITALS 1925-1934 Inclusive

Carcinoma Male Patients
Sarcoma Male Patients
Carcinoma Female Patients
Sarcoma Female Patients

Patients Dying in SALT LAKE CITY HOSPITALS



Patients Treated and Discharged from SALT LAKE CITY HOSPITALS



4. Sites Involved By Primary Carcinoma Lesions.

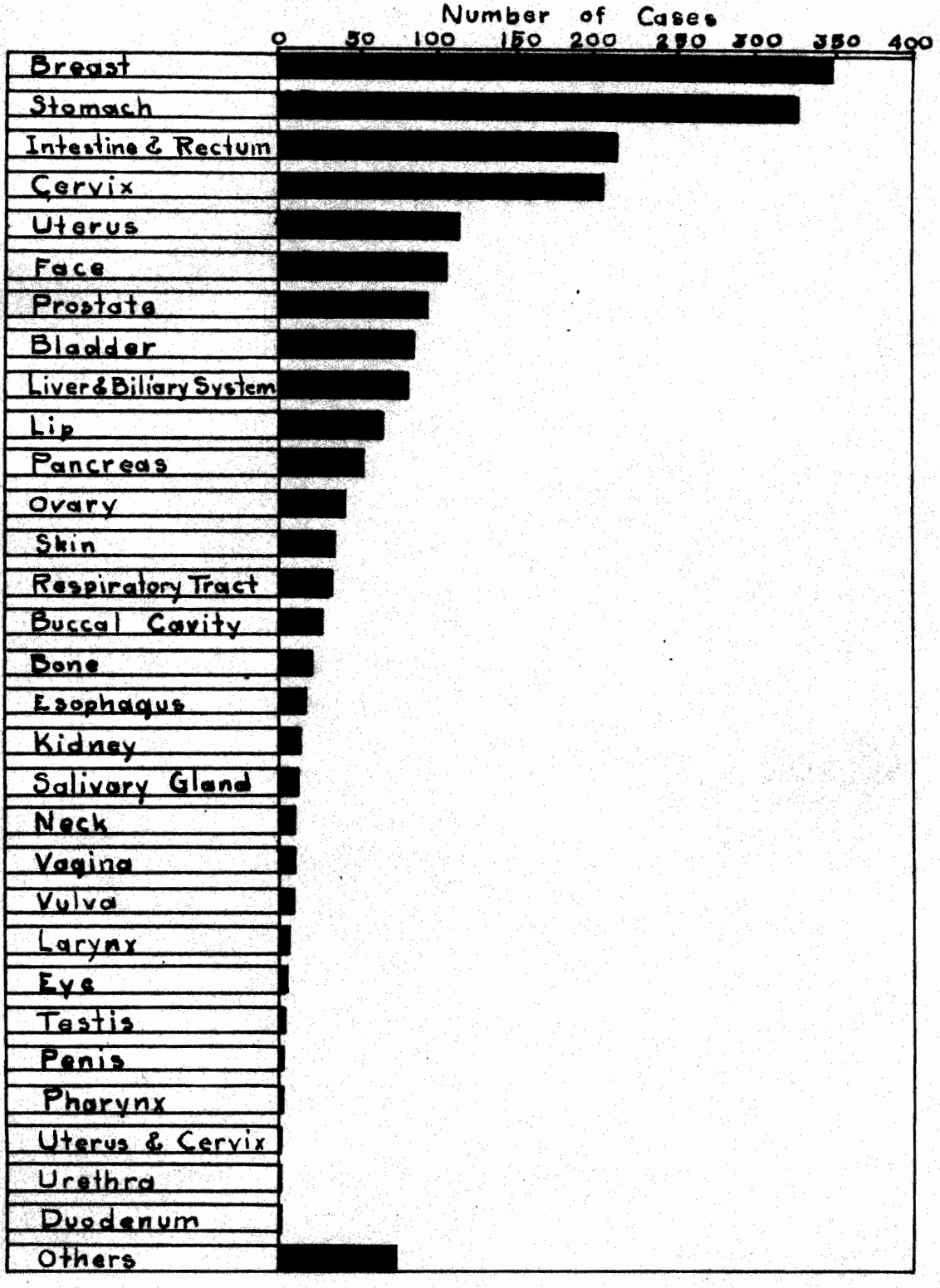
Table XIV - Carcinoma.
Distribution By Site of 2119 Primary Lesions of Carcinoma Studied in a Survey of Salt Lake Hospitals, 1925-1934 Inc.

Site of Primary Lesion	Patients Dying In Hospitals				Patients Treated and Discharged				Gr. Tot.	% of Gr. Tot.
	Male		Female		Male		Female			
	T.	%of T.	T.	%of T.	T.	% of T.	T.	% of T.		
Breast	1	.3	35	15.0	3	.5	306	32.9	346	16.3
Stomach	101	29.4	36	15.5	114	18.8	77	8.1	328	15.5
Intestine & Rec.	61	17.7	33	14.2	63	10.5	62	6.6	219	10.3
Cervix	0	-	25	10.7	0	-	183	19.0	208	9.8
Uterus	0	-	36	15.5	0	-	78	8.3	114	5.4
Face	12	3.5	4	1.7	65	10.8	31	3.3	112	5.3
Prostate	33	9.6	0	-	66	10.9	0	-	99	4.7
Bladder	24	6.9	4	1.7	39	6.5	0	1.0	76	3.6
Liver & Biliary System	16	4.7	20	8.6	17	2.8	20	2.1	73	3.4
Lip	3	.9	0	-	58	9.6	1	.1	62	2.9
Pancreas	24	6.9	11	4.7	10	1.7	12	1.3	57	2.7
Ovary	0	-	10	4.3	0	-	36	3.9	46	2.2
Skin(N.O.S.)*	3	.9	1	.4	26	4.3	12	1.3	42	2.0
Respiratory	21	6.1	0	-	14	2.3	3	.3	38	1.8
Buccal Cavity	6	1.7	0	-	21	3.5	5	.5	32	1.5
Bone	3	.9	2	.9	14	2.3	3	.3	22	1.1
Esophagus	5	1.5	1	.4	10	1.7	4	.4	20	1.0
Kidney	6	1.7	0	-	9	1.5	4	.4	19	.9
Salivary Gland	1	.3	0	-	11	1.8	6	.6	18	.8
Neck	2	.6	3	1.3	6	1.0	6	.6	17	.8
Vagina	0	-	1	.4	0	-	16	1.7	17	.8
Vulva	0	-	1	.4	0	-	15	1.6	16	.7
Larynx	6	1.7	0	-	6	1.0	2	.2	14	.6
Eye	0	-	0	-	8	1.3	3	.3	11	.5
Testis	1	.3	0	-	8	1.3	0	-	9	.4
Penis	0	-	0	-	8	1.3	0	-	8	.4
Pharynx	4	1.2	0	-	2	.3	1	.1	7	.3
Uterus & Cervix	0	-	0	-	0	-	4	.4	4	.2
Urethra	0	-	0	-	0	-	3	.3	3	.1
Duodenum	0	-	0	-	0	-	1	.1	1	.1
Others	11	3.2	10	4.3	26	4.3	35	3.8	82	3.9
Totals	344	100	233	100	603	100	939	100	2119	100

*N. O. S. - Not Otherwise Specified.

GRAPH IX

Distribution of 2119 Carcinoma Patients Studied in a survey of SALT LAKE CITY HOSPITALS 1925-1934-Inclusive



Carcinoma of the breast, cervix and corpus uteri comprise the majority of the tumors. The breast shows a percentage of 16.3 and is the most frequent site of the tumor. It is essentially a disease found in the female, but may occur in the male. Four cases of carcinoma of the breast in the male were found out of a total of 346 cases. This constitutes 1.15% of all mammary carcinomas. According to Ewing, "The estimates of its frequency have varied from .86% of all mammary cancers (Williams) to 6% by La Forgne."[1]

The second most frequent site involved is the stomach which constitutes 15.5% of all the carcinomas. Here the male predominates. Two hundred and five out of three hundred twenty-eight cases, or 62.19% of the stomach carcinomas occur in the male. The frequency of sarcoma of the stomach was small as shown in Table VI. There was one case of gastric sarcoma. It occurred in a male patient treated and discharged from the hospital and constituted .65% of all the sarcomas. The disease is apparently more malignant in the male; 46.97% die while 31.85% of the females having gastric carcinoma die. Both sexes show a high death percentage when this site is considered with all others. Gastric carcinoma constitutes 29.4% dying in the hospitals and 15.8% of these are females. The majority of these patients enter the hospital complaining of vague or even acute gastric distress lasting over relatively long periods of time. As a result the death rate for this disease is high; the lesion is

---

[1]Ewing- Op.Cit. p. 577.

usually so advanced that nothing can save the patient.

There were 219 cases of carcinoma of the intestine and rectum or 10.3% of all the carcinomas involved these sites. Here as above the male predominates. 124 cases, or 56.62% of the carcinomas of the intestine and rectum, occur in the male patient. The malignancy of the growth is high in this case, as in the stomach, for both sexes. Carcinoma of this site constitutes 17.7% of the males dying in the hospital and 14.2% of the females. The chief reason for this is probably the advanced stage of the growth at the time of admission to the hospital.

The sites occurring fourth and fifth in frequency are those of the cervix and corpus uteri. Carcinoma of the cervix includes 9.8% of the tumors and carcinoma of the body of the uterus 5.4%. The percentage of deaths is high. Patients dying of carcinoma of the cervix show 10.7% of the females dying in the hospital, while epithelial cancer of the body of the uterus accounts for 15.5% of the females dying.

Males show a greater frequency in carcinoma of the face than do females. This may be due to occupational factors. They predominate in carcinoma of the bladder and have an almost complete monopoly on carcinoma of the lip. There was one instance of a female patient diagnosed as carcinoma of the lip. Occupational and habit factors are probably the explanation. These will be discussed later. About the same

proportion of males and females is seen in the case of carcinoma of the buccal cavity and larynx in this study. Statistics generally give the male a dominant position here. These ratios are shown in Graph IX.

5. Types of Treatment Used For Carcinoma Patients.

Sugary is by far the treatment most frequently used. There were 1036 cases out of 2119 or 48.89% that were treated surgically. The patients that were treated with surgery and discharged from the hospital formed a large percentage of the patients living. Of all the males discharged 53.51% were treated surgically, while 53.46% of the females received similar treatment. The percentage of deaths for male and female were equally similar. The males dying in the hospital and treated surgically are 36.91% of all the males dying. The females show 36.05% of the patients dying in the hospitals. Sarcoma patients did not show such even percentages. The females constitute the majority of surgically treated sarcomas in this survey. Such a condition does not usually prevail.

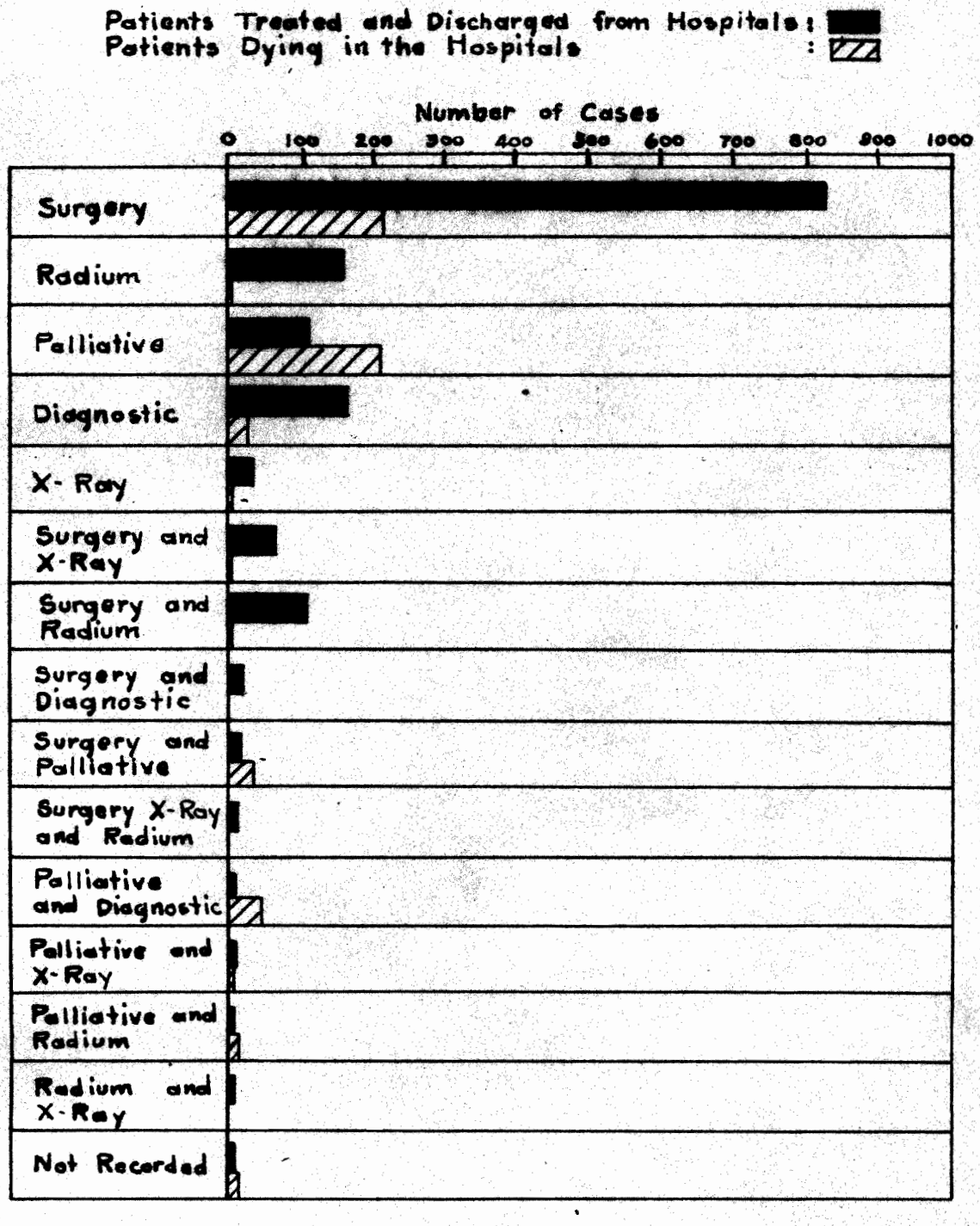
Table XV - Carcinoma.
Types of Treatment Used in 2119 Cases of Carcinoma Studied in a Survey of Salt Lake City Hospitals - 1926-1934 Inclusive.

Type of Treatment	Patients Dying in Hospital: Male T.	Male % of T.	Female T.	Female % of T.	Patients Treated & Discharged: Male T.	Male % of T.	Female T.	Female % of T.	Gr. Tot.	% of Gr. Tot.
Surgery	127	36.91	84	36.05	323	53.57	502	51.46	1036	48.89
Palliative	131	38.08	73	31.33	53	8.79	51	5.43	308	14.54
Diagnostic	16	4.65	11	4.72	101	16.75	66	7.03	194	9.16
Radium	1	.29	8	3.44	20	3.32	140	4.91	169	7.98
Surgery-Radium	0	-	7	3.01	27	4.48	77	8.20	111	5.24
Surgery X-ray	6	1.74	0	-	25	4.15	39	4.15	70	3.30
Palliative Diagn.	32	9.31	11	4.72	4	.66	6	.64	53	2.50
X-ray	2	.58	6	2.56	16	2.65	15	1.60	39	1.84
Surgery Palliat.	13	3.78	11	4.72	7	1.16	8	.85	39	1.84
Surgery Diagnos.	1	.29	0	-	11	1.82	6	.64	18	.85
Palliative X-ray	3	.88	7	3.00	3	.49	3	.32	16	.75
Palliative Radium	1	.29	8	3.44	1	.17	6	.64	16	.75
Radium X-ray	0	-	2	.86	0	-	9	.96	11	.52
Surg.-ra-X-ray	0	-	1	.43	3	.50	6	.64	10	.47
No Record of Tr.	11	3.2	4	1.72	9	1.49	8	.83	29	1.37
Totals	344	100	253	100	603	100	959	100	2119	100

As illustrated in Graph X, palliative treatment in carcinoma, as in sarcoma, is the second type most frequently used. The big percentage is in the number of males dying. 38.08% of all the male carcinoma patients dying in the hospital are treated palliatively. The females of this class show 31.33% of all the females dying. Palliation for patients discharged from the hospital is not so frequent a treatment. Palliative measures are used almost wholly in far advanced stages of

GRAPH X

Types of Treatment Used For 2119 Cases of Carcinoma Studied in a Survey of SALT LAKE CITY HOSPITALS 1925-1934 - Inclusive



carcinoma, and as a result deaths are numerous. These percentages indicate that a large number of patients enter a hospital with the tumor so far advanced that little or nothing can be done for them.

Diagnostic treatment is third in frequency of use. Among the male patients discharged from the hospital those treated for diagnosis show after surgical treatment that 101 patients out of 605, or 16.75%, were in the hospital for diagnosis only. Many of these came with growths in such an advanced stage that after diagnosis was made, the patient was discharged with the words "to go home to die".

Radium used alone accounts for 7.98% of the types of treatment and when combined with surgery 5.24%. Surgery with X-ray was used in 3.3% of the carcinoma patients. X-ray when used alone constitutes a smaller percentage (1.84%) than was expected.

6. Occupational Frequency.

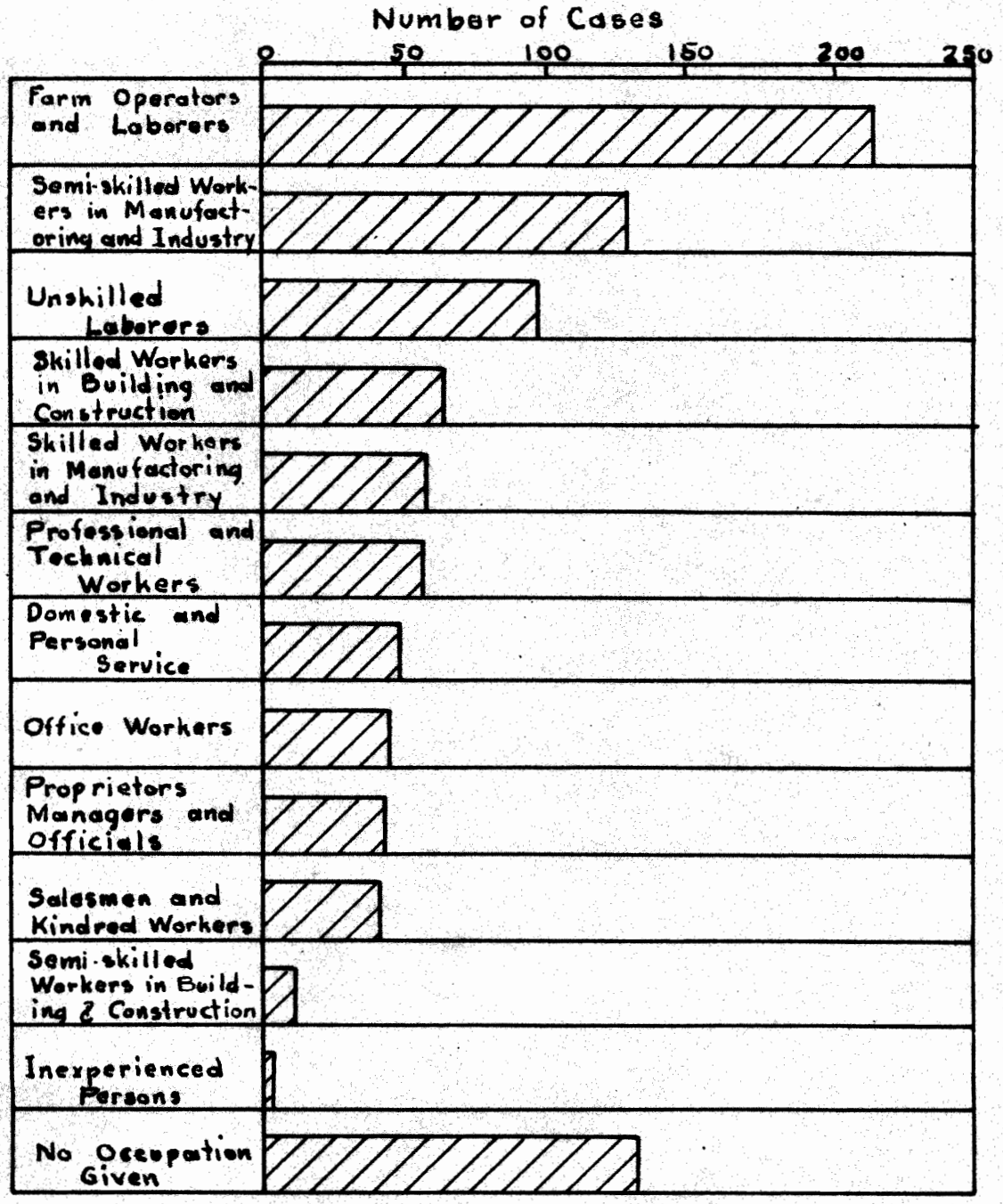
Table XVI - Carcinoma.
Distribution of Occupations Among 947 Male Carcinoma Patients Studied in a Survey of Salt Lake Hospitals 1925-1934 Inclusive.

Occupation	Total	% of Total
Farm Operators and Laborers	212	22.46
Semi-skilled Workmen and Foremen in Manufacturing and Industry	134	14.14
Unskilled Laborers	94	9.92
Skilled Workmen and Foremen in Building and Construction	67	7.07
Skilled Workmen and Foremen in Manufacturing and Industry	58	6.12
Professional and Technical Workers	57	6.01
Domestic and Personal Service	47	4.96
Office Workers	45	4.75
Proprietors, Managers and Officials	42	4.43
Salesmen and Kindred Workers	41	4.32
Semi-skilled Workers and Foremen in Building and Construction	12	1.26
Inexperienced Persons	4	.42
No Occupation Listed	134	14.14
Totals	947	100

As with sarcomatous growths carcinoma attacks the farm operator and laborers more often than any other occupational group (Graph XI). This is really to be expected since these two occupational groups form the majority of hospital admittance of all the cancer cases studied. The farm operators and laborers claim 22.46% of the male carcinoma patients. The group of professional and technical workers comes sixth in frequency with a percentage of 6.01%. Carcinoma seems to concentrate on the farmer and laborer. Sarcoma claimed

GRAPH XI

Occupational Distribution of 947 Male Carcinoma Patients Studied in a Survey of SALT LAKE CITY HOSPITALS 1925-1934 - Inclusive



9.52% of the male sarcoma patients. There is no class exempt from cancer.

A big difference is seen in the group of inexperienced people. In sarcoma this group came second with 14.28%. In carcinoma there were four cases or .42% diagnosed as having this tumor. Table IX shows a young age grouping of sarcoma patients and the much older age ranges of carcinoma has been seen (Table XI). The patients represented in this occupational group are young and therefore it is not surprising to find sarcoma more prevalent than carcinoma.

Notice the large percentage (14.14%) of cases showing no occupation. The patient's records are incomplete among all cancers. In sarcoma patients 13.13% had no occupation listed. None of the records states any occupation previous to the time of admission to the hospital. In personal histories there was an occasional case where the occupation previous to the hospital admission was noted. There was no way of tracing occupational employment at the time the tumor was first noticed or any positions held in former times that might have had some significance.

7. Etiologic Factors Seen in Carcinoma.

In sarcoma trauma was the most frequent etiologic factor. In carcinoma this factor is seen in 3.78% of the cases, (Graph XII). Here precancerous lesions constitute 12.98% of this malignancy. A hereditary factor runs second in the

list of causes for both sarcoma and carcinoma. In the former 8.39% of sarcomatous tumors showed histories of cancer in the family. In carcinomatous growths 6.32% show a

Table XVII - Carcinoma.
Etiologic Factors Observed in 2119 Carcinoma Patients Studied in a Survey of Salt Lake Hospitals, 1925-1934 Inc.

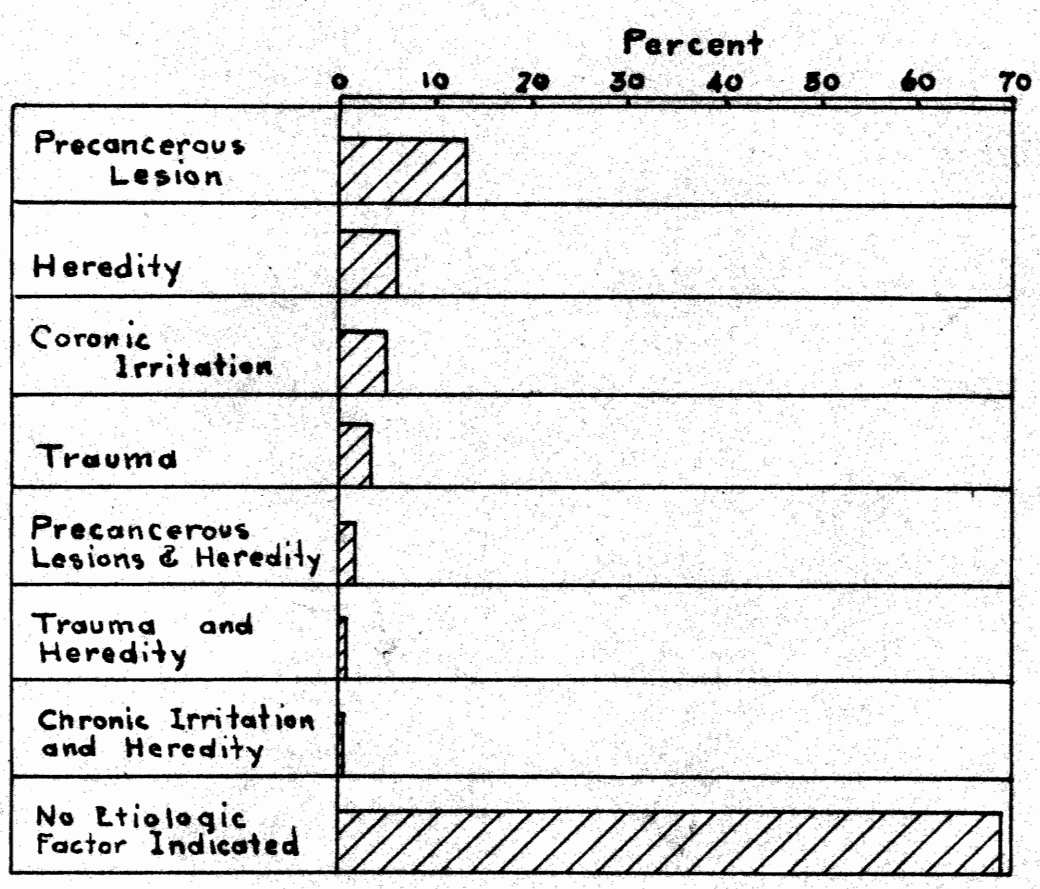
Etiologic Factors	Male		Female		Grand Total	% of Gr.T.
	Tot.	% of T.	Tot.	% of T.		
Precancerous Lesion	88	9.29	187	15.95	275	12.98
Heredity	55	5.81	79	6.74	134	6.32
Chronic Irritation	81	8.55	30	2.56	111	5.24
Trauma	30	3.17	50	4.26	80	3.78
Precancerous Lesion and Heredity	1	.11	22	1.88	23	1.09
Trauma and Heredity	4	.42	11	.94	15	.71
Chronic Irritation and Heredity	7	.74	3	.26	10	.47
Not Indicated	681	71.91	790	67.41	1471	69.42
Totals	947	100	1172	100	2119	100

hereditary factor. These percentages are not large and according to Ewing "the effect of climate, food, habits of life, and occupation, and even mental eccentricities, all of which pass in families, must be considered in estimating the significance of a family history of cancer. These factors seem at times capable of submerging any influence of heredity, but have been almost wholly neglected in statistical studies."[1]

[1] Ewing, Op.Cit. p. 111.

GRAPH XII

Etiologic Factors Seen Among 2119 Cancer Patients Studied in a Survey of SALT LAKE CITY HOSPITALS 1925-1934 - Inclusive



The fact that 134 cases out of 2119 have histories showing cancer in the families would indicate that more coincidence might account for the cancerous offspring. However, as seen in Table XVII hereditary factors when combined with other etiologic factors account for 2.27% of the carcinomas, and this with consideration of the above would indicate slight hereditary predisposition but not direct hereditary tendencies.

Such factors as chronic irritation and inflammation play a greater roll in ctrcinoma than in sarcoma. The inflammatory reaction noticed so frequently in carcinomatous growths is typical of this tumor. These factors are seen in 5.24% of the carcinomas and only 1.94% of the sarcomas. The malignant tumor of carcinoma develops from epithelial tissue. It is this type of tissue that is most often subjected to forms of irritation, and it is not surprising to notice the larger percentage occurring in the malignancy discussed here.

Both malignancies show the large percentage of cases with no personal history or incomplete histories. (Tables IX and XVII) Greater care on the part of the interne in taking down the personal history and in seeking information is needed. There are many times when the patient gives no cooperation and no history bearing on the growth can be obtained, but the above percentages of incomplete records are far too high.

CHAPTER III

OTHER MALIGNANCIES

As shown in Table III there are five other types of malignancies studied in this survey. There are so few of these cases that it is difficult to compile representative percentages for each tumor. The following tables will list the various factors for each malignancy. The cancers included here are twenty-five cases of hypernephroma, twenty-two cases of lympho-Sarcoma, sixteen cases of malignant melanoma, four of Hodgkin's disease, and four chorionepitheliomas.

Table XVIII - Other Malignancies.
Sex Frequency as Seen in 25 Hypernephromas, 22 Lymphosarcomas, 16 Malignant Melanomas, 4 Hodgkin's Disease, 4 Chorionepitheliomas, Studied in a Survey of Salt Lake Hospitals, 1924-1954 Inclusive.

Sex	Hyperne-phroma	Lympho-sarcoma	Malignant Melanoma	Hodgkin's Disease	Chorion-epithelioma
Male	14	12	8	2	0
Female	11	10	8	2	4
Total	25	22	16	4	4
% of 2409 Cancer Cases	1.04%	.91%	.66%	.17%	.17%

According to the above table the distribution of these malignancies is rather evenly distributed between male and female, with one exception - the chorionepitheliomas. The latter encountered in this survey are limited to those of

uterine origin. This tumor may arise in the testis but no cases of this type were found. As may be seen from the above numbers, there can be no definite conclusions drawn. There were not enough cases to give reliable information as to the various factors discussed for malignant tumors.

As shown in Table XVIII the males constitute fourteen, or 56.0%, of the twenty-five cases of hypernephroma. The females represent 44.0% of this malignancy. These percentages, keeping in mind the few cases encountered, agree fairly well with those mentioned by Stout. "Bothe (1926) in a statistical study found 244 (61%) in males and 156 (39%) in females."[1] On a whole this malignancy is much more frequent in the male than the female.

In lymphosarcomatous tumors the males were found to predominate. Twelve cases or 54.55% were found to be male patients. Ten cases or 45.45% were in the females. In referring to age and sex incidence for lymphosarcoma, Hodgkin's disease and related conditions (excluding the leukemias) Stout writes, "The diseases were distinctly more common in males than in females - 327 (68%) were males and 150 (32%) were females, a ratio of 2.12 to 1. Out of the larger group they recorded that there were 173 cases of Hodgkin's disease, and of these 112 (64.7%) were males and 61 (35.3%) were females."[2] There were only four cases of Hodgkin's disease found in the survey covering a ten year period. Two of the

---

[1]Stout, Op.Cit. p. 483.
[2]Ibid p. 801.

four cases were in the male and two in the female. No conclusions can be drawn from so few cases.

The chorionepithelioma is essentially a disease found in the female patient. The origin of the tumor being from the syncytial and Langhan's cells of the chorion and the organ being the uterus explains the sex incidence of this tumor. In discussing chorionepitheliomas of the testis Stout writes, "These are extremely rare variations of malignant teratomas."[1] The tumor is not frequent in the female and this is well shown in that only four cases were found during a ten year period.

Sixteen cases of malignant melanoma were studied and these were evenly distributed among the two sexes. This is one of the commonest tumors encountered in male or female. The malignant melanoma so often springs from the common mole or naevus which is present in practically everyone that it is not surprising to see no difference in the distribution of the tumor between sexes.

---

[1] Ibid p. 445.

2. Age Distribution.

Table XIX - Other Malignancies.
Age Distribution Seen in 25 Hypernephromas, 22 Lymphosarcomas, 16 Melanomas, 4 Hodgkin's Disease, 4 Chorionepitheliomas Studied in a Survey of Salt Lake Hospitals, 1925-34 Inc.

Years of Age.	Hypernephroma Male T.	Male %	Female T.	Female %	Lymphosarcoma Male T.	Male %	Female T.	Female %	Malignant Melanoma Male T.	Male %	Female T.	Female %	Hodgkin's Disease Male T.	Male %	Female T.	Female %	Chorionepithelioma Total	Female %
0 - 4	0	-	0	-	0	-	0	-	0	-	0	-	0	-	0	-	0	-
5 - 9	0	-	0	-	2	16.66	2	20.0	0	-	0	-	0	-	0	-	0	-
10-14	0	-	0	-	0	-	0	-	0	-	0	-	0	-	0	-	0	-
15-19	0	-	0	-	0	-	3	30.0	0	-	0	-	0	-	0	-	0	-
20-24	0	-	0	-	0	-	1	10.0	0	-	0	-	0	-	0	-	0	-
25-29	1	7.14	0	-	2	16.66	1	10.0	0	-	0	-	1	50.0	1	50.0	0	-
30-34	0	-	0	-	0	-	0	-	0	-	0	-	0	-	0	-	1	25.0
35-39	1	7.14	0	-	0	-	0	-	0	-	2	25.0	0	-	0	-	2	50.0
40-44	2	14.29	0	-	0	-	0	-	1	12.5	0	-	0	-	0	-	0	-
45-49	0	-	0	-	0	-	0	-	0	-	2	25.0	1	50.0	0	-	0	-
50-54	6	42.85	3	27.27	2	16.66	0	-	4	50.0	0	-	0	-	0	-	1	25.0
55-59	0	-	2	18.18	0	-	2	20.0	2	25.0	0	-	0	-	0	-	1	0
60-64	2	14.29	2	18.18	0	-	0	-	1	12.5	2	25.0	0	-	0	-	0	-
65-69	0	-	3	27.27	3	25.01	0	-	0	-	0	-	0	-	0	-	0	-
70-74	2	14.29	1	9.10	3	25.01	0	-	0	-	0	-	0	-	1	50.0	0	-
75-79	0	-	0	-	0	-	1	10.0	0	-	1	12.5	0	-	0	-	0	-
80-84	0	-	0	-	0	-	0	-	0	-	0	-	0	-	0	-	0	-
85-89	0	-	0	-	0	-	0	-	0	-	0	-	0	-	0	-	0	-
90-94	0	-	0	-	0	-	0	-	0	-	1	12.5	0	-	0	-	0	-
Totals	14	100	11	100	12	100	10	100	8	100	8	100	2	100	2	100	4	100

With the exception of the lymphosarcomas the age groups affected are those of middle and old age. The few cases studied give no more than an idea of the grouping. In malignancies of hypernephromatous type 42.85% of the males fell into the fifty to fifty-five age group. The females show 27.27% in this group and in the sixty-five to sixty-nine years of age. According to statistics found by Bothe, "of 317 in which the age was given 28% were in the decade from forty to fifty years, 37.8% from fifty to sixty years, and 14% from sixty to seventy years. The rest were scattered from infancy to old age and included eleven cases in the first decade of life."[1] With the exception of one male in the group twenty-five to thirty years of age none of the younger age groups was affected by the tumor. This is a disease falling primarily into the forty to seventy-five groups.

Beyong showing a younger age grouping the figures shown in Table XIX do not agree with those given by Stout. There are so few cases of lymphosarcoma (22) and Hodgkin's disease (4) that no conclusions can be reached, and Stout's conclusions will be quoted. He discusses the two malignancies together. "The age peaks were reached for the whole group in the five-year periods, twenty to twenty-four and thirty-five to thirty-nine years. *** The largest number of cases (Hodgkin's disease) occurred in the period from fifteen to

[1]Stout, Op.Cit. p. 483.

thirty years with a moderate rise in the incidence curve at the five-to-ten-year period. In general, therefore, it may be said that Hodgkin's disease is more commonly encountered at an earlier age than is lymphosarcoma. They also show that in both diseases the frequency peak for females is about five years later in life than for males."[1] These statistics were taken from 447 cases of lymphosarcoma, Hodgkin's disease and related conditions (but excluding the leukemias with frank blood pictures) studied by Minot and Isaacs (1926).

The malignant melanomas are cancers involving people in the older age groups. The tumor itself takes a long time to grow, and when it reaches its apparent growth the neoplasm seems in the majority of cases to remain for some time in a stage of inertia. After this the tumor enlarges and becomes malignant. Of course there are many variations in the progress and development of this disease. That given above is the type usually seen. Many spread rapidly and metastasize early. The groups affected range from forty to sixty-five.

---

[1] Ibid, p. 801.

5. Death Percentages.

Table XX - Other Malignancies.
Death Percentages Seen in 26 Hypernephromas, 22 Lymphosarcomas, 16 Malignant Melanomas, 4 Hodgkin's Disease and 4 Chorionepitheliomas Studied in a Survey of Salt Lake Hospitals. 1925-1934 Inclusive.

Patients Concerned	Hypernephr. Male T.	Hypernephr. Male %	Hypernephr. Female T.	Hypernephr. Female %	Lymphosarcc. Male T.	Lymphosarcc. Male %	Lymphosarcc. Female T.	Lymphosarcc. Female %	Malig.Melan. Male T.	Malig.Melan. Male %	Malig.Melan. Female T.	Malig.Melan. Female %	Hodgkin's Male T.	Hodgkin's Male %	Hodgkin's Female T.	Hodgkin's Female %	Chorionepith. Female Total	Chorionepith. Female %
Patients Dying in Hospitals	3	21.42	0	0.0	6	50.0	3	30.0	3	37.5	1	12.5	0	0.0	0	0.0	1	25.0
Patients Treated & Discharged From the Hospitals	11	78.58	11	100	6	50.0	7	70.0	5	62.5	7	87.5	2	100	2	100	3	75.0
Totals	13	100	11	100	12	100	10	100	8	100	8	100	2	100	2	100	4	100

The hypernephromas are practically all malignant. The few cases listed in Table XX show that practically all cases of hypernephroma are discharged from the hospital. There were four patients dying in the hospital and three of them were males. "Hyman (1925) found that the ultimate mortality in hypernephroid tumors was between 65 and 75 percent, Rose (1925) found that hypernephroma gives a higher percentage of long survivals than hypernephroid carcinomas."[1]

According to statistics on lymphosarcoma and Hodgkin's disease given by Minot and Isaacs the male patients show a higher mortality than the females. The younger males had the more malignant and rapidly growing tumors than the older males. The opposite is true of the females where the greater malignancy and mortality appears among the older women. Table XX shows a higher mortality for male patients than for females having lymphosarcoma. The age distribution for lymphosarcoma in Table XIX shows the majority of the females falling in younger age ranges. These same principles hold true for Hodgkin's disease, but since only four cases were encountered in the survey no conclusions can be pointed out.

"True malignant chorionepitheliomas composed exclusively of Langhan's cells and syncitium are always malignant and are practically sure to kill."[2] Of the four cases studied three were discharged from the hospital and one died in the hospital. All were treated surgically, and after the opera-

---

[1]Stout, Op.Cit. p. 502.
[2]Stout, Op.Cit. p. 369.

tion the patients went home. Since no follow-up work could be carried out the results of these three patients are not known.

The mortality of the melanotic cancer varies with its malignancy. If the tumor is rapidly growing and undergoing early and widespread metastases, as is so often the case, the mortality is high. Otherwise the patient may live for years. As seen in Table XX four of the sixteen cases of malignant melanoma died in the hospital. So many outside factors influence the malignancy of a melanoma that it is difficult to state definitely the mortality.

4. Sites of Lesions.

The hypernephroma is essentially a tumor of the kidney. Cases are reported where the uterus, ovary, broad ligament and suprarenal glands have been primarily involved. However, these are rare. The origin of this malignancy is much debated (arising from adrenal rests, Grawitz's theory). Misplaced adrenal tissue may be found, according to Ewing, along the suprarenal vein, solar plexus and inferior surface of the liver; along the internal spermatic vein, in the broad ligament and about the uterus, ovary and tube in the female; or in the spermatic cord in the male. While eighteen, or 72.0%, of the twenty-five cases of hypernephroma encountered here were found involving the kidney, two cases were primary in the ovary and two in the suprarenal gland.

Table XXI - Other Malignancies.

Sites of Lesions of 25 Hypernephromas, 22 Lymphosarcomas, 16 Malignant Melanoma, 4 Hodgkin's and 4 Chorionepithelioma Studied in a Survey of Salt Lake Hospitals, 1926-1934 Inclusive.

Sites of Lesions.	Hypernephroma Total	%	Lymphosarco. Total	%	Malig. Melan. Total	%	Hodgkin's Total	%	Chorionepith. Total	%
Ovary	2	8.00								
Eye					6	37.50				
Suprarenal	2	8.00			1	6.25				
Foot					1	6.25				
Kidney	18	72.00								
Shoulder					1	6.25				
Heel					1	6.25				
Thigh							1	25.0		
Ear					1	6.25				
Intrathoracic							1	25.0		
Lymph Nodes			10	45.45						
Scalp			1	4.55	1	6.25				
Intestines			3	13.64						
Uterus									4	100
Abdomen			2	9.08						
Back			2	9.08			2	50.0		
Nose			1	4.55						
General			1	4.55						
Bladder			1	4.55						
Leg			1	4.55						
Not Given	3	12.00			3	18.75				
Totals	25	100	22	100	16	100	4	100	4	100

Lymphosarcoma and Hodgkin's disease involve mainly groups of lymph nodes and lymphatic tissue. It is not surprising to find then the majority of the tumors studied falling into the groups shown in Table XXI. The groups of nodes most commonly involved are the cervical, mediastinal, retroperitoneal and mesenteric. Lymphosarcoma of the gastro-intestinal tract is a common site, and three (13.64%) of the twenty-two cases were found in the intestines. The tumors may involve almost any organ by direct invasion from the main growth, through the lymphatic channels, or by blood stream to a slight extent.

All four of the chorionepitheliomas are located in the uterus. This disease in itself is uncommon, and is rare when found in other sites. A diagnosis of primary chorion-epithelioma of some other organ is debatable. The growth may be secondary while the primary tumor is either very small or has vanished. Involvement of the testis by this growth has been reported but is extremely rare.

The sites involved by the malignant melanoma are unusually varied. It is interesting to notice the number of cases having this cancer of the eye (Table XXI). The skin and the choroid coat of the eye are the sites most frequently affected. After these the tumor may be found almost anywhere. Metastatic tumors may appear long before the primary tumor is noted and may be found anywhere in the body.

5. Types of Treatment Used.

Table XXII - Other Malignancies.
Types of Treatment Used For 25 Hypernephromas, 22 Lymphosarcoma, 16 Malignant Melanomas, 4 Hodgkin's and 4 Chorionepitheliomas Studied in a Survey of Salt Lake Hospitals. 1925-1935 Inclusive.

Treatment	Hypernephroma Tot.	%	Lymphosarcoma Tot.	%	Malignant Melanoma Tot.	%	Hodgkin's Disease Tot.	%	Chorionepithelioma Tot.	%
Surgery	14	56.0	14	63.63	9	56.25	2	50.0	2	50.0
Palliative	5	20.0	4	18.17	1	6.25				
Surgery X-ray	1	4.0	1	4.55	1	6.25	2	50.0	1	25.0
" Radium			1	4.55	1	6.25			1	25.0
" Palliative			1	4.55	1	6.25				
Palliative X-ray	1	4.0	1	4.55						
" Diagnos.	1	4.0			2	12.50				
X-ray					1	6.25				
Diagnostic	2	8.0								
Radium X-ray	1	4.0								
Totals	25	100	22	100	16	100	4	100	4	100

Surgery and palliative measures are again the treatments most frequently used. Radical excision of the malignant tumor is the treatment of choice and seems to be the most successful. Fourteen (56.00%) of the twenty-five cases of hypernephroma were treated surgically. Stout brings out a good point and one that applies in a large measure to all cancers and explains the large numbers of palliative cases noticed before. "Fuchs and Paulk (1928) have tried to find out why so many patients are inoperable when they finally reach the surgeon. The reasons were varied in the 18 cases studied; 3 had metastases from a silent kidney tumor. In 5 the early symptoms were referable to the bladder and urethra. In 5, although conditions were apparently favorable, exploration showed a greater local spread than was expected; 2 had paid no attention to hematuria from one to three years, and 3 had refused operation when in an operable stage."[1] These points have been noticed time and again with reference to other malignancies.

While the majority of tumors are treated surgically, the lymphosarcomas are treated more frequently with irradiation than other types of malignancy. The same principles are true for Hodgkin's disease, but the few cases studied can give no definite idea of the treatment. Surgery combined with radium or deep X-ray therapy is the treatment

---

[1]Stout, Op.Cit. p. 501.

preferably used. The lymphomas are the most sensitive of cancers to radiation, and good results are seen in the rapidly growing tumors of the lymphoid tissue.

Two of the four cases of chorionepithelioma were treated surgically, and the other two were given radium or X-ray in combination with surgery. Radiation kills the Langhan's and synctial cells easily, but the danger of transforming some into radio-resistant and growing cells is great, and metastasis results. Surgical removal of the organ involved is advocated if at all possible.

The malignant melanomas are among the most radio-resistant tumors that are malignant. Surgery which is deep and extensive is about the only means of therapy that can be used. The regional lymph nodes are so early invaded that wide dissection must be carried out. As seen in Table XXII the majority of the melanomas were treated surgically.

6. Occupational Frequency.

Table XXIII - Other Malignancies.
Occupational Distribution Among Male Patients: 14 Hypernephromas, 12 Lymphosarcomas, 8 Malignant Melanomas, 2 Hodgkin's Disease, Studied In A Survey of Salt Lake Hospitals. 1925-1934 Inclusive.

Occupation.	Hypernephroma		Lymphosarcoma.		Malignant Melanoma		Hodgkin's Disease	
	Tot.	%	Tot.	%	Tot.	%	Tot.	%
Professional & Technical Work	0	-	0	-	0	-	0	-
Proprietors, Managers, Officials	1	7.14	0	-	0	-	0	-
Office Workers	3	21.43	1	8.33	1	12.5	1	50.0
Salesmen and Kindred Workers	1	7.14	2	16.67	1	12.5		
Skilled Workmen & Foremen in Bldg.& Constrn.	1	7.14	0	-	1	12.5		
Skilled Workmen & Foremen in Manuf. & Industry	0	-	0	-	0	-		
Semi-skilled Workmen & Foremen in Bldg.& Constr.	0	-	0	-	0	-		
Semi-skilled Workmen & Foremen in Mfg. & Indus.	1	7.14	1	8.33	1	12.5		
Unskilled Laborers	2	14.3	2	16.67	1	12.5	1	50.0
Domestic & Personal Service	1	7.14	1	8.33	1	12.5		
Farm Operators & Laborers	3	21.43	2	16.67	1	12.5		
Inexperienced	0	-	2	16.67	0	-		
Not Given	1	7.14	1	8.33	1	12.5		
Totals	14	100	12	100	8	100	2	100

It is hard to determine any actual occupational incidence with so few cases. As has been seen in the sarcomas and carcinomas the occupational class of "farm operators and laborers" are more often involved than other groups. Since this group claims a large percentage of the population of surrounding states, the number of cancer cases would naturally be larger for this group. Besides this there are etiologic factors present that would have a bearing on the growth. There are too few cases here to allow any conclusions to be drawn for the types of cancer listed in Table XXIII.

7. Etiologic Factors.

The majority of the tumors fall into the "unknown" group as far as personal histories are concerned. Because of this and the small number of cases from which to draw standards just a mention will be made of the etiologic factors found for the five tumors shown in Table XXIV.

It is interesting to see that two of the twenty-five cases of hypernephroma gave a history of injury. Trauma, as an etiologic factor, is always under suspicion. The time element is hard to place definitely, and the injury may draw attention to a preexisting tumor that had been "silent". The patient is not always definite as to the time relation between the injury and the appearance of the tumor.

Chronic irritation and inflammation plays an important part as an etiologic factor in the lymphosarcomatous tumors.

Table XXIV - Other Malignancies.
Etiologic Factors Seen In 25 Cases of Hypernephroma, 22 Lymphosarcoma, 16 Malignant Melanomas, 4 Hodgkin's Disease and 4 Theriomepitheliomas Studied in a Survey of Salt Lake Hospitals. 1926-1934 Inclusive.

Etiology	Hypernephroma		Lymphosarcoma.		Malignant Melanoma		Hodgkin's Disease		Chorionepithelioma	
	T.	%	T.	%	T.	%	T.	%	T.	%
Precancerous Lesions	0	-	0	-	2	12.5			3	75.0
Trauma	2	8.00	1	4.54	0	-				
Heredity	0	-	1	4.54	0	-				
Chronic Irritation	0	-	1	4.54	2	12.5				
Unknown	23	92.00	19	86.38	10	62.5	4	100	1	25.0
Trauma & Irritation					1	6.25				
Precancerous & Trauma					1	6.25				
Totals	25	100	22	100	16	100	4	100	4	100

The lymphatic system is the filter of the body and the nodes are constantly being bombarded by toxins and irritating substances. Trauma and heredity which show one case each were probably due to coincidence.

As would be expected the majority of the malignant melanomas fall into the group of "precancerous lesions" and "chronic irritation". The naevi and benign moles are considered precancerous. It is not often they are absent, so it might be expected to find this group predominating. Chronic irritation plays an important part. Cases included here gave no history of irritation of an existing lesion but development of the lesion after irritation, for example, such as walking while wearing a shoe with a nail in the heel that irritated, and the later appearance of a tumor on the heel. The naevi are usually quiescent, but if irritated or injured they not infrequently grow suddenly larger, ulcerate and become darker. Stout and Ewing point out that a hereditary tendency is strong. This factor was not shown at all.

The four cases of Hodgkin's disease gave no clues as to etiology. However, such factors as infections and tuberculosis especially seem to play a big part. The question is much debated, and no conclusive decision seems to have been reached. The bulk of evidence does seem to point to tuberculosis as a causative factor in many cases.

Three of the chorionepitheliomas gave histories of miscarriages and abortions. The histories gave no explanation of why these occurred, but there must have been some unusual general or special condition present in the uterus. Possible origins and lesions are the hydatidiform mole which is present in "about 30 percent of the cases,"[1] or the tumor may develop from fetal tissue following an abortion or miscarriage.

---

[1] Boyd, Op.Cit. p. 630.

CHAPTER IV

CANCER

Table XXV - Cancer Trends.
Numbers of 2409 Cancer Patients Admitted To Salt Lake Hospitals from 1924-1935.

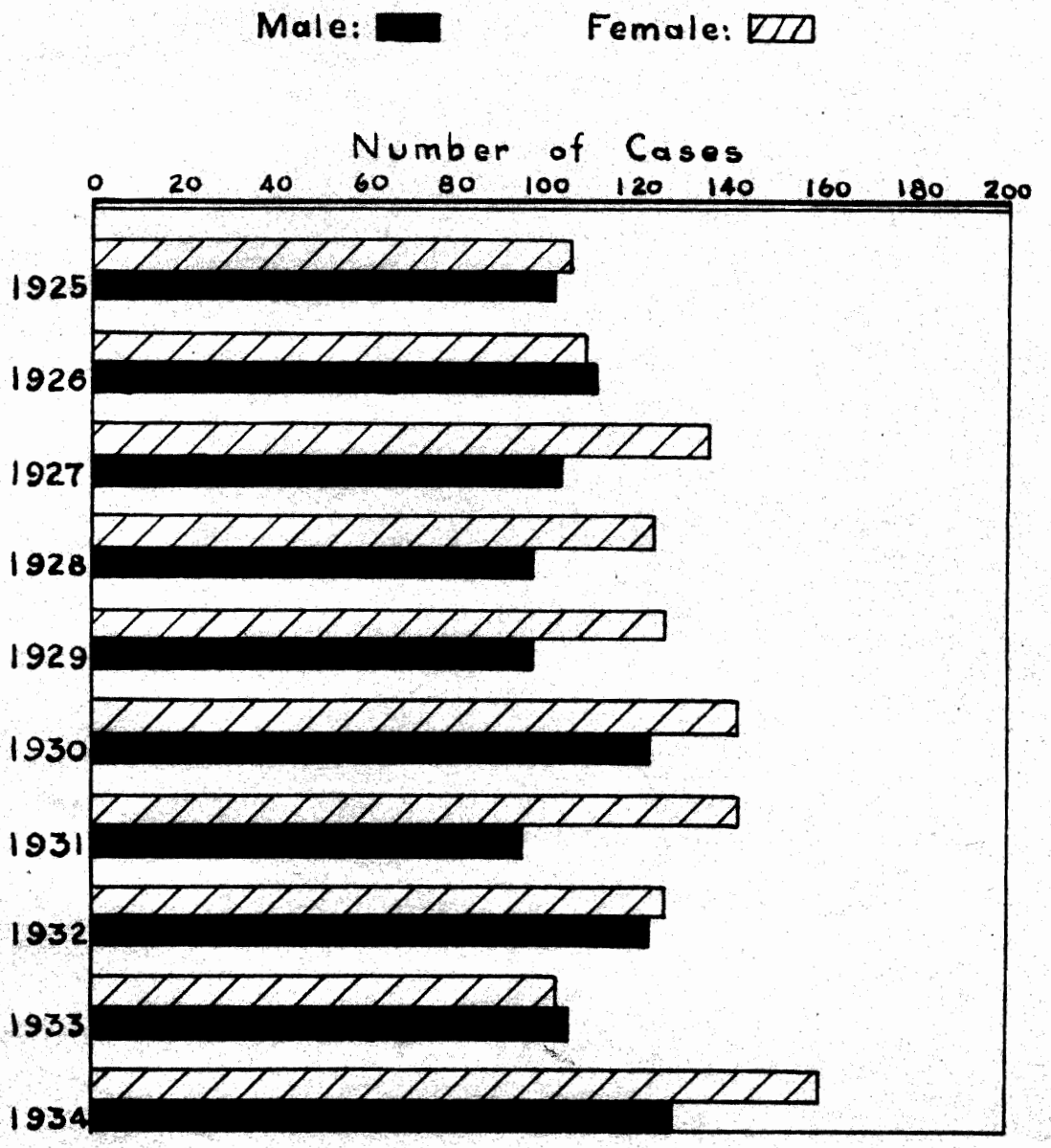
Year of Admission	Male	Female	Total
1925	99	116	215
1926	121	119	240
1927	114	136	250
1928	97	124	221
1929	97	127	224
1930	122	141	263
1931	91	140	231
1932	124	127	251
1933	114	113	227
1934	127	160	287
Totals	1106	1303	2409

The word "cancer" as used here refers to all malignant growths. A short discussion of these as a whole will be made here to show any increase in the number of hospitalized cancer cases, the age distribution of all malignancies and the mortality frequency.

Table XXV and Graph XIII show an irregular but steady increase in the number of cancer patients coming to Salt Lake Hospitals. Within the last three or four years, beginning probably about 1930, the cancer problem began to receive more attention than had formerly been given to it. As a result by 1934 considerable literature tending to educate

GRAPH XIII

Number of 2409 Cancer Patients Admitted to
SALT LAKE CITY HOSPITALS
For Each Year Between 1925-1934 Inclusive



the public had been published and the organization of cancer clinics was being planned. These factors may account for the big jump seen in 1934. Much of the public educational measures has been directed to cancer of the skin, breast and cervix uteri. It is interesting to notice the big increase in the number of female patients. The latter tumor types are primarily those involving the female patient.

Table XXVI - Cancer Trends.
Mortality of 2409 Hospitalized Cancer Patients Studied In A Survey of Salt Lake Hospitals, 1925-1934 Inclusive.

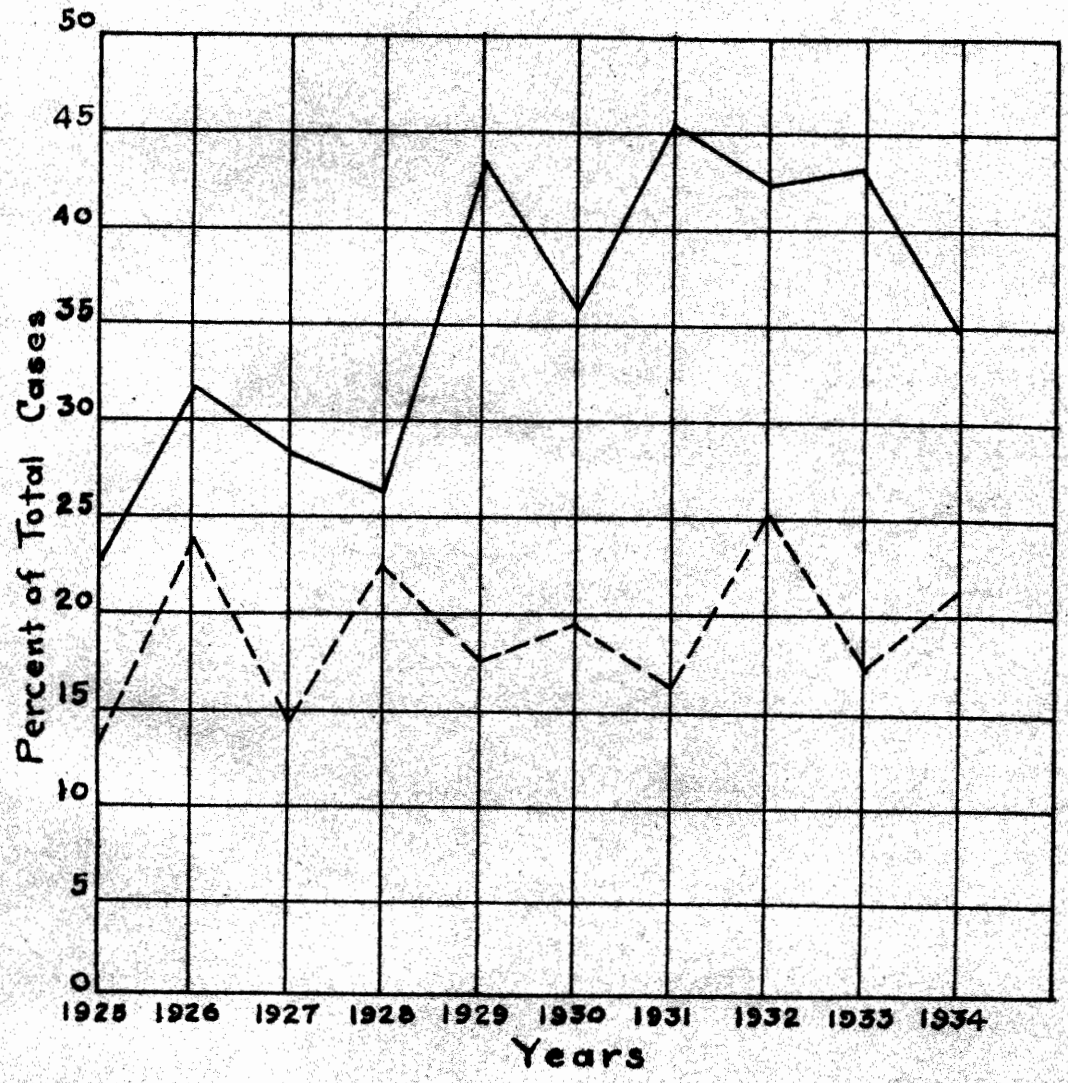
Year Of Admission.	Male				Female				Total.
	Patients Dying		Patients Dischg.		Patients Dying		Patients Dischg.		
	Tot.	%	Tot.	%	Tot.	%	Tot.	%	
1925	28	22.2	77	77.8	21	18.10	95	81.90	215
1926	38	31.4	83	68.6	29	24.36	90	75.64	240
1927	32	28.1	82	71.9	20	14.71	116	85.29	250
1928	26	26.8	71	73.2	28	22.58	96	77.42	221
1929	43	44.3	54	55.7	22	17.32	105	82.68	224
1930	43	35.2	79	64.8	28	19.85	113	80.15	263
1931	41	45.1	50	54.9	25	16.43	117	83.37	251
1932	53	42.7	71	57.3	32	25.19	95	74.81	251
1933	49	43.0	65	57.0	20	17.69	93	82.31	227
1934	44	34.6	83	65.4	34	21.25	126	78.75	287
Totals	391	35.4	715	64.6	256	24.45	1047	75.55	2409

The mortality of hospitalized cancer cases shows a similar increase and is striking among the male patients. (Graph XIV). The cancers of males in this survey are found most frequently involving the stomach and large intestines, just the opposite of the relatively easily located tumors of the breast and cervix of the female, which are easy to diagnose. As a result the tumor is often far advanced, and little can

GRAPH XIV

Percent Mortality of 2409 Hospitalized Cancer Patients Studied In a Survey of SALT LAKE CITY HOSPITALS 1925-1934 - Inclusive

Male: —— Female: – – –



be done to save the life of the patient in the former situation. The females show a slight yet decided increase in the death rate but when the large increase of female hospital admittances is remembered, it is not surprising to find an accompanying slight increase in the number of deaths.

The age distribution of all malignancies falls into the older age groups as would be expected since carcinoma, by far the most prevalent malignant tumor, is a disease of middle and old age. As seen in Table XXVII and Graph XV, cancer may be found at any age. However, it is uncommon in youth and the ages most commonly affected range from forty-five to seventy. Notice the very decided peak reached in the sixty to sixty-five group in the male. The female cancer patient shows a younger and longer age grouping. She falls into the forty-five to sixty-five years of age. This may be explained again by the usual sites involved by the commonest type of tumor.

Table XXVII - Cancer.

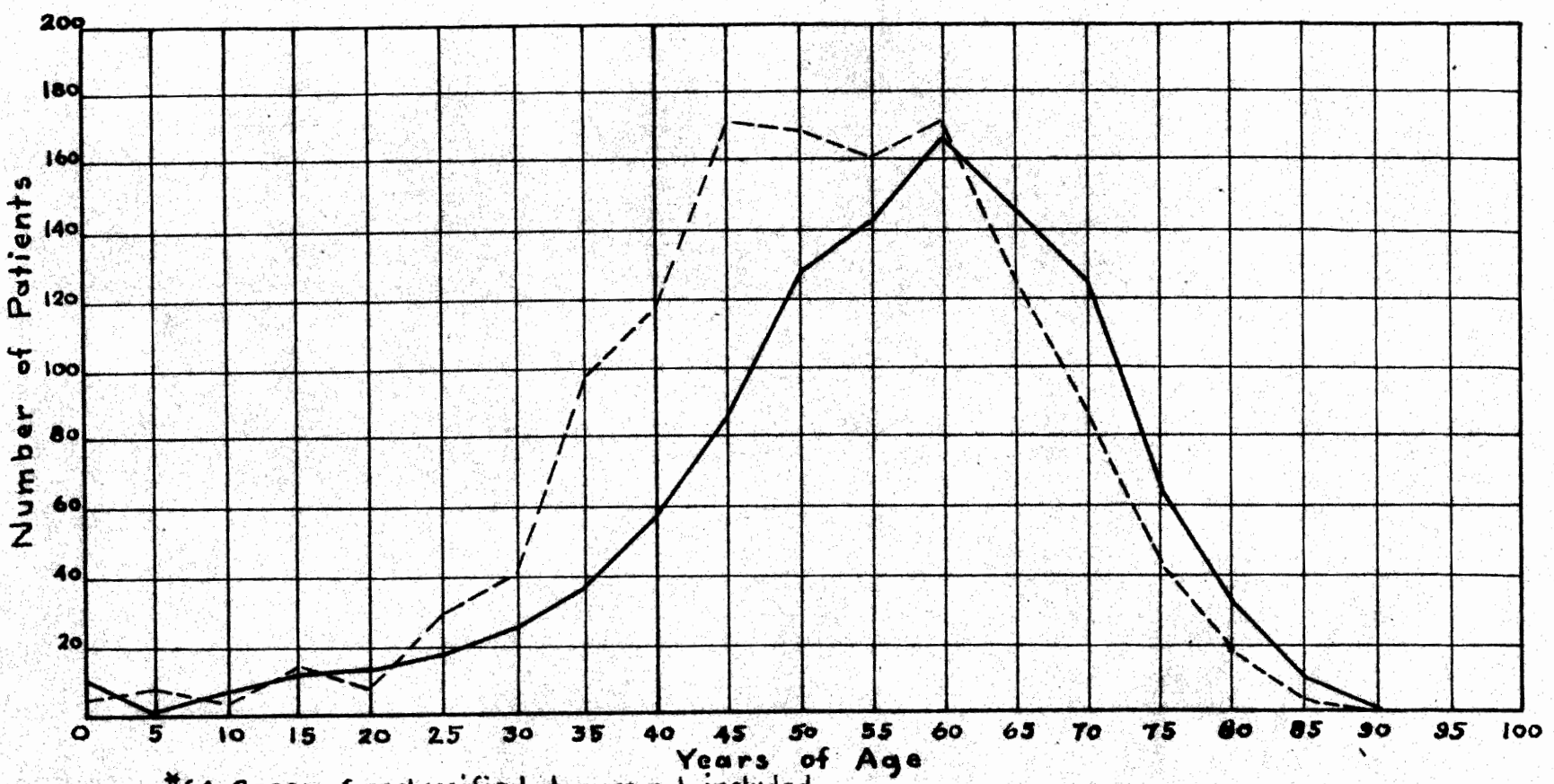
Age Distribution Among 2545 Cancer Patients Studied In a Survey of Salt Lake City Hospitals, 1925-34 Inc.

Years Or Age	Male Tot.	Male %	Female Tot.	Female %	Grand Total	% of Total
0 - 4	10	.94	4	.31	14	.60
5 - 9	0	-	6	.47	6	.30
10-14	5	.47	4	.31	9	.38
15-19	9	.84	11	.86	20	.85
20-24	10	.94	8	.63	18	.77
25-29	16	1.50	29	2.27	45	1.92
30-34	23	2.16	41	3.21	64	2.73
35-39	36	3.37	97	7.59	133	5.67
40-44	58	5.44	119	9.31	177	7.55
45-49	87	8.15	175	13.69	262	11.17
50-54	130	12.18	172	13.46	302	12.89
55-59	142	13.31	166	12.98	308	13.12
60-64	171	16.03	176	13.77	347	14.80
65-69	147	13.78	122	9.55	269	11.47
70-74	124	11.62	82	6.42	206	8.77
75-79	62	5.81	44	3.44	106	4.52
80-84	28	2.62	19	1.49	47	2.00
85-89	9	.84	2	.16	11	.47
90-94	0	-	1	.08	1	.04
Totals	1067	100	1278	100	2345	100

GRAPH XV

Age Distribution Among 2345 * Cases of Cancer Studied
in a survey of
SALT LAKE CITY HOSPITALS
1925-1934 Inclusive

Male: —— Female: - - -



*64 Cases of unclassified tumors not included

PART III

SUMMARY AND CONCLUSIONS

SUMMARY AND CONCLUSIONS

Findings can be given only for carcinoma and sarcoma. So few cases are represented in the malignancies of hypernephroma, lymphosarcoma, malignant melanoma, Hodgkin's disease and chorionepithelioma, that no standards could be derived in this study. Carcinoma forms 87.97% of all hospitalized cancer patients, and sarcoma drops second with 6.45%. Undoubtedly carcinoma forms the majority of malignant tumors. However, the scarcity of other malignancies over a ten year period seems to need some explanation. Altogether 2409 cases of cancer were studied. Sixty-four of these were designated as "growth", "tumor" or "malignancy", and could be put under no classification. It is interesting to notice that there were thirteen hospital deaths among these sixty-four cases. Probably a large percentage of these patients were diagnosed as having a malignancy when a benign tumor was present, or they had only the symptoms of a malignant growth. No tabulations were made for these patients. Information concerning them was too vague and scarce to allow any certainty as to their malignancy. Of the 2409 patients 1262 were diagnosed pathologically as well as clinically. That leaves about half of the patients diagnosed only by clinical methods. Be-

sides the fact that carcinoma is the commonest of malignant growths, mistaken diagnoses occur as to type of malignancy, and many of the tumors are recorded as carcinoma when in reality they were other types of malignancy. These differences in classification were brought out in many of the pathological diagnoses. For this thesis, however, the clinical diagnosis was accepted even though unaccompanied by a pathological report, and the resulting distribution of types of malignancy appeared.

1. Sex Frequency.

The female predominates among the carcinoma patients (55.31%). This may be due to the frequency with which the tumor attacks the mammary gland, the cervix uteri and the corpus uteri. The male patients constitutes 44.69% of the hospitalized carcinoma cases. Among the sarcoma patients the males are found more often. They show 54.19% of the sarcomas and the females 45.81%. Sarcoma involves bone more often than any other tissue, and it is commonly agreed that osteogenic sarcoma is much more frequent in the male than in the female. These factors are brought out in this study. Bone sarcomas are found to constitute 21.85% of all the sarcoma tumors.

2. Age Distribution.

Both malignancies affect middle and old age more often than other age groups. Carcinoma is found most frequently between the ages of fifty and seventy-five in the male and forty-five to seventy in the female. Sarcoma has a much younger age grouping. This tumor is found in males fifteen to twenty, and forty-five to fifty years of age. The females most frequently affected are in the forty to forty-five and fifty-five to sixty years of age distribution. It must be remembered that these ages were taken at the time the patients were admitted to the hospital. The cancer patient is notorious for the way he delays in seeking medical attention. As a result these age groups are older than they would be if the actual age of the patient at the time of appearance of the tumor could be determined.

3. Death Frequency.

The two tumors are remarkably similar here. Carcinoma shows a slightly higher degree of deaths than does sarcoma. Among the carcinoma patients 36.33% of the males and 19.89% of the females died. The male sarcoma patients show 30.97% dying and 19.72% of the females dying. The deaths indicated here are those of patients dying in the hospital. They are not a good indication of the real death rate of cancer. They are of more value in showing the relatively large num-

ber of patients coming to the hospital with a malignancy so advanced that nothing can save them. This is more characteristic of the male than female. These death rates can probably be explained by the sites involved. For example, carcinoma of the stomach and intestines form the majority of this malignancy in the male. These sites are comparatively inaccessible, and diagnosis and treatment are difficult. Lack of cooperation with the doctor by the patient is also an important factor.

To show the results of treatment and the real death rate of cancer "follow-up" work should be done. After treatment, the patient is discharged and the hospital frequently has no further record of the case. "Follow-up" work has been planned and definite advances have been made within the last three or four years.

4. Sites Involved By The Lesions.

The five sites most frequently involved by carcinoma in the order of frequency are the breast (16.3%), stomach (15.5%), intestine and rectum (10.3%), cervix uteri (9.8%), and body of uterus (5.4%). The five sites involved by sarcoma are those of bone (25.81%), lymph nodes (7.10%), leg (7.10%), skin (6.45%), and ovary (6.45%).

It was found that sexes varied as to sites of the lesion characteristic of any one sex. Four cases out of 346 carcinomas of the breast occurred in the male patient.

In malignancy of the gastro-intestinal tract the males predominate. Gastric ulcers are a debatable subject as to whether they are precancerous or not. It is well known that these ulcers occur much more frequently in the male than in the female. If they are to be considered precancerous another explanation of the frequency of involvement of this organ can be added to those suggested; such as the greater alcohol consumption and faulty diet of the male. The fact that the cervix uteri shows a high percentage of involvement can be explained by the prevalence of etiologic factors such as tears, lacerations, erosions and chronic infection.

The site involved by the sarcoma lesion leaves little doubt as to the frequency of involvement of organs. The osteogenic sarcomas are by far the most common of the connective tissue tumors. The male predominates, but this site is involved in the female more often than other sites.

5. Types of Treatment Used.

Surgery appears to be the treatment of choice in all types of malignant tumor included in this study. Malignancies are characterized by local invasion and destruction and a distinct tendency to set up secondary tumors in distant organ or tissues. Extensive and radical excision of the tumor mass must be made to stop destruction of near and distant tissues. If this treatment is done at an early state in the growth of the malignancy a cure results. This

is the aid of present educational programs on cancer. However, notice that palliative treatment is the second most frequently used and is accompanied by a high death rate. These patients are reached too late, and besides making them as comfortable as possible nothing can be done to rid them of cancer.

Radiation by X-ray and radium is often used alone, or, as more frequently occurs, in conjunction with surgery. This treatment causes the death of tumor cells and a sclerosing, fibrosing process results. The danger of metastasis is decreased, and more and more often radiation is used in preparation for operation. Radio-resistance of the tumor depends on the type of malignancy. Usually the greater the degree of differentiation the more the resistant is the tumor. The highly anaplastic, richly cellular growths are very susceptible to radiation, and under treatment the young tumor cell mass gradually disappears and heals.

6. Occupational Frequency.

The majority of the population of Utah, Idaho, Nevada and Wyoming (states from which the majority of the patients are drawn) fall into the farming and mining classes. This same distribution is seen among the hospitalized cancer patients. 212 (22.46%) of the 947 cases of male carcinoma patients fall into the occupational group of "Farm Operators" and "Laborers" and 14.14% came under the class of "semi-skilled Workers and Foremen in Manufacturing and Industry".

Besides the natural frequency of these classes seen throughout these states, there are certain etiologic factors present in farming and mining that would affect the incidence of cancer. Sun, dust and drying winds are forms of chronic irritation. For example, carcinoma of the face was sixth in frequency of the sites involved.

The occupational distribution among eighty-four male sarcoma patients shows the majority (16.66%) under "Farm Operators and Laborers". The second group was that of "Inexperienced Persons" (14.28%). This group includes the younger people having little experience. The tumor is one that occurs among the younger age groups. The group of "Office Workers" shows a higher incidence among the sarcoma patients than is present among the carcinoma patients. Just why this should be true cannot be explained.

7. Etiologic Factors.

As would be expected, precancerous lesions are more prevalent among carcinoma patients and trauma among sarcoma patients. The sites involved most often by carcinoma are those showing glandular activity or are exposed to irritation. These sites often show areas of epithelial hyperplasia that in many cases show signs of malignancy. These areas are called "precancerous", but it must be remembered that the word does not imply "a definite sequence of events". Such lesions as Pagets' disease, chronic mastitis, cervical

erosion, leukoplakia and ulcers are included under the term "precancerous".

The importance of trauma as an etiologic factor in sarcoma is questionable. The history of injury is obtained from the patient and may not be accurate. The lesion may have been small but present before the injury and the physiological condition of the patient must be considered. It is well known, however, that trauma is frequently connected with the appearance of sarcomatous lesions.

Both tumors show histories of cancer in the patients family, but the number of cases reported can be accounted for by coincidence. There are enough cases to show a predisposition, but direct hereditary tendencies cannot be proved.

There has been an increase in the number of cancer patients admitted to Salt Lake City Hospitals during the past ten years (1925-1935). The increase has been irregular and slow, but a definite rise can be seen. The State and County Medical Associations acting on the recommendations of the American Society For The Control Of Cancer have begun to organize cancer clinics, a "follow-up" service, history sheets for the cancer patients and education of the public. These activities may account for the very decided jump in the number of cases admitted in 1934. The better methods of diagnosis and better diagnostic facilities account for some of the increase in the number of cases.

At the time this survey was made two hospitals were using history sheets intended only for the cancer patient. These sheets give full and accurate information regarding the family history of malignancy, type or types of treatment used, site involved, complete personal history with emphasis on any possible etiologic factor, occupations engaged in at the present time or previous to admission to hospital, date of first symptoms and diagnosis, sites of metastases, laboratory and biopsy finding and miscellaneous data. These sheets are complete and would be excellent for statistical "follow-up" work. The very basis of any knowledge about cancer must be made from statistical material, and all of the hospitals should use one of these cancer sheets in the patient's hospital record. The record room or historian should see that all the information has been filled in and the sheet as complete as possible. The interne should be unusually careful and painstaking in recording the desired information. The two hospitals using the cancer history sheet were making more or less of an experiment. It was the first year they had been used, and of course little could be determined from them. The chief fault seemed to be in the negligence of the interne. In all the records studied this same incompleteness was found. Of course the fault cannot be laid entirely at the feet of the interne with the exclusion of other departments. The business offices need more careful recording of ages and

occupations and the record room in checking on the records and seeing that they are complete.

It was originally planned in this study to follow up each case of cancer in order to determine five-year cures, results of treatment and length of time and sites of re-curring tumors. Lack of funds and equipment made this phase of the study impossible. However, a list has been prepared which includes each cancer patient studied during the ten-year period of 1925-1935. The patient's name, address if a non-resident of Utah, name of attending doctor, name of hospital attended and year of admission are included in this list. The information obtained from a follow-up of these cases would be valuable. Under the supervision of the Board of Health a project might be organized which could carry on this work for not only Salt Lake City but for the whole State of Utah.

This survey of hospitalized cancer cases has shown:

1. Carcinoma patients constitute the majority of cancer admissions to the hospitals.
2. Females predominate among the carcinoma patients studied in this survey, and males predominate among the sarcoma patients.
3. Carcinoma occurs in patients of middle and old age. Sarcoma appears in the young and middle-aged.
4. The mortality rates of the carcinomatous and sarcomatous tumors studied are practically the same.

5. Carcinoma involves most frequently the breast, stomach and intestine, while sarcoma appears more often in bone than any other site.
6. Surgery alone or in conjunction with radium and X-ray is the treatment most frequently used in this study.
7. Both carcinoma and sarcoma appear in the "Farm Operator and Laborer" class more frequently than any other occupational group.
8. Definite conclusions cannot be drawn as to etiologic factors present. The records are too incomplete. However, "precancerous lesions" are more prevalent among the carcinoma patients and "trauma" among the sarcoma patients.
9. Direct hereditary tendencies for carcinoma or sarcoma cannot be proven.
10. There has been a slow and irregular increase in the number of hospitalized cancer cases admitted to Salt Lake City Hospitals during a ten year period (1915-1924).

A foundation for future statistical studies of the cancer patient has been laid. The inadequacy of present methods for recording cancer information has been further demonstrated, and microscopic material has been prepared for educational purposes.

Literature Referred To

I. Books

Bainbridge, William Seaman. The Cancer Problem.
The MacMillan Company. New York, 1914.

Boyd, William. Surgical Pathology 2nd Edition.
W. B. Saunders Company. Philadelphia & London 1929.

Boyd, William. A Text-Book of Pathology.
Lea and Febiger. Philadelphia, 1932

Ewing, James. Neoplastic Diseases. 3rd Edition.
W. B. Saunders Company. Philadelphia & London 1928

Hoffman, Frederich L. The Mortality From Cancer Throughout The World.
The Prudential Press. Newark, New Jersey, 1915

Meigs, Joe Vincent. Tumors of the Female Pelvic Organs.
The MacMillan Company. New York, 1934

Stout, Arthur Purdy. Human Cancer.
Lea and Febiger. Philadelphia, 1932

Tobey, James A. Cancer - What Everyone Should Know About It.
Alfred A. Knopf. New York, 1932

II. Periodicals

Abell, Irvin. "Five Year Cancer Cures." Surgery, Gynecology and Obstetrics. February, 1934 Vol. 58.

Alvarez, Walter C. "Cancer Relief." Surgery, Gynecology and Obstetrics. February, 1933 Vol. 56.

Beach, Ralph M. "Chorionepithelioma Treated with Radium Followed by Hysterectomy." American Journal of Obstetrics and Gynecology.
May, 1934 Vol. 27.

Bishop, Everett L. "Cancer of the Stomach In Young Patients."
American Journal of Cancer. April, 1934 Vol. 20.

Literature Referred To (Cont'd)

Bloodgood, Joseph Colt. "When Should Irradiation With Radium or X-ray Be Employed Without Operation?" Annals of Surgery, Nov. 1932 Vol. 96.

Bolduan, Charles and Weiner, Louis. "Is Cancer Becoming More Prevalent?" American Journal of Cancer. August, 1934. Vol. 21.

Bunnag, Toemsand Bachman, Carl. "Chorionepithelioma Of The Fallopian Tube." American Journal Of Obstetrics And Gynecology. February, 1934. Vol. 27.

Burke, I. M. "Metastatic Tumors Of The Heart." American Journal Of Cancer. January, 1934. Vol. 20.

Butterworth, Thomas and Klander, Joseph O. "Malignant Melanomas Arising In Moles." Journal Of The American Medical Association. March 10, 1934. Vol. 102.

Coley, William B. "Multiple Myeloma." Annals of Surgery. January, 1931. Vol. 93.

Cookson, H. A. "Contact Spread Of Epithelioma From Scrotum To Thigh." Lancet. December 10,1932. Vol.223.

Crever, Lloyd F. "Etiology of Cancer." Bulletin Of The American Society For The Control Of Cancer. March, 1936. Vol. 18. No. 3.

Curtis, M. R., Dunning, W. F., Bullock, F. D. "Duration and Extent of Irritation Versus Genetic Constitution In Etiology Of Malignant Tumors." American Journal Of Cancer. July, 1934. Vol. 21.

Eggers, H. E. "The Etiology of Cancer." Archives Of Pathology. January, 1932. Vol. 13.

Foss, Harold L. "The Cancer Problem In The General Hospital." Annals of Surgery. 1932 Vol. 96.

Freedman, Nathan. "Precancer of Cervix Uteri." Surgery, Gynecology And Obstetrics. April, 1934. Vol. 58.

Galligan, John J. "Five Year Cures In Cancer." Surgery, Gynecology And Obstetrics. February, 1934. Vol. 58.

Gates, Olive and Warren, Shields. "The Grading of Epidermoid Carcinoma." Surgery, Gynecology And Obstetrics. June, 1934. Vol. 58.

Literature Referred To (Cont'd)

Geschickter, Charles P. "Multiple Myeloma As A Single Lesion." Annals of Surgery. August, 1930. Vol. 92.

Geschickter, Charles P. and Copeland, Murray. "Multiple Myeloma." Archives Of Surgery. April, 1928. Vol. 16.

Haagensen, Cushman D. "An Exhibit Of Important Books, Papers And Memorabilia Illustrating The Evolution Of The Knowledge Of Cancer." American Journal Of Cancer. May, 1933. Vol. 18.

Harding, Warren H. and Kimball, Theodore S. "Solitary Myeloma (Plasmacytoma) Of The Femur. Report of One Case." American Journal Of Cancer. September, 1932. Vol. 16.

"Indispensibility Of Cancer Case Statistics." Bulletin of The American Society For The Control Of Cancer. January, 1934. Vol. XVI No. 1.

Kennedy, Robert H. "Epithelioma Of The Lip." Annals Of Surgery. January, 1934. Vol. 99.

Lakey, Franck, H. "Follow Up Statistics Of Five Year Cures In Cancer." Surgery, Gynecology And Obstetrics. February, 1933. Vol. 56.

Little, C. C. "The Bearing Of Genetic Work With Transplanted Tumors On The Genetics Of Spontaneous Tumors On Mice." American Journal Of Cancer. November, 1934. Vol. 22.

MacCarty, William Carpenter. "The Cancer Problem ToDay." Journal Of The American Medical Association. September 29, 1934. Vol. 103.

MacKenty, John Edmund. "Malignant Disease Of The Larynx." Archives Of Otolarynology. September, 1934. Vol. 20.

Macklin, Madge Thurlow. "Is The Increase Of Cancer Real Or Apparent." American Journal Of Cancer. September, 1932. Vol. 16.

Martin, Franklin H. "Cancer Is Curable." American Journal Of Surgery. May, 1933. Vol. 20.

Literature Referred To (Cont'd)

Merrill, Dudley. "Mistaken Diagnosis Of Cancer." New England Journal Of Medicine. November 1, 1934. Vol. 211.

Meyer, Willy. "Inoperable And Malignant Tumors." Annals Of Surgery. November, 1932. Vol. 96.

Miller, James Raglan. "Do Official Death Rates For Diabetes, Cancer Or The Puerperal State Accurately Reflect Present Conditions?" New England Journal Of Medicine. March 2, 1933. Vol. 208.

Montgomery, Douglas W. and Viecelli, James D. "The Question of Irradiation By X-rays As A Cause Of Sarcoma." British Journal Of Dermatology And Syphilis. June, 1933. Vol. 45.

"The Need For Better Cancer Statistics." American Journal Of Cancer. June, 1933. Vol. 18.

"The Need Of Studies In The Incidence Of Cancer." Bulletin Of American Society For the Control Of Cancer. March, 1936, Vol. 18 No. 3.

Newcomb, W. D. "Peptic Ulcer And Gastric Carcinoma." British Journal Of Surgery. 1932. Vol. 20.

Petersen, William F. "American Distribution Of Deaths From Cancer Of The Skin, Mouth And Breast." Archives Of Dermatology And Syphilology. September, 1934. Vol. 30.

Pirchan, Aug. and Sikl, H. "Cancer Of The Lung In The Miners Of Jachymoo (Joachimstal)" American Journal Of Cancer. July 1932. Vol. 16.

Potter, Edith Louise. "Hodgkin's Disease With Special Reference to Its Differentiation From Other Diseases Of Lymph Nodes." Archives of Pathology. February, 1935. Vol. 19.

Quick, Douglas. "Radiation In Operable Cancer." New England Journal Of Medicine. January 5, 1933. Vol. 208.

Rodman, J. Stewart. "Chronic Cystic Mastitis." Annals of Surgery. 1932. Vol. 96.

Seelig, M. G. and Cooper, Zola K. "Light and Tar Cancer." Surgery, Gynecology And Obstetrics. April, 1933. Vol. 56.

Literature Referred To (Cont'd)

Selig, Seth. "The Metastasis Of Melanoma To The Groin Four Years Before The Appearance Of The Primary Lesion On The Heel." American Journal Of Cancer. March, 1934. Vol. 20.

Simmons, Channing C. "Delay In The Treatment Of Cancer." New England Journal Of Medicine. May 25, 1933. Vol. 208.

Warren, Shields and Gates, Olive. "Multiple Primary Malignant Tumors. A Survey Of The Literature And A Statistical Study." American Journal Of Cancer. November, 1932. Vol. 15.

Wild, William F. "A Survey Of Cancer Cases In The Hospitals Of Bridgeport Connecticut, 1928-1932 Inclusive." American Journal Of Cancer. December, 1934. Vol. 22.

Wilson, Edwin Bidwell. "Value Of Statistical Studies Of The Cancer Problem." American Journal Of Cancer. September, 1932. Vol. 16.

Wood, Harold B. "Reliability Of Cancer Statistics." American Journal Of Surgery. 1932. Vol. 18.

Zavadskaia, N. Dobrovalskaia. "Heredity Of Cancer." American Journal Of Cancer. June, 1933. Vol. 18.

Zlisler, Edwin P. "Cancer Of The Skin." Surgery, Gynecology And Obstetrics. 1933. Vol. 56.

III. Miscellaneous

"Cancer Survey of Utah." American Society For The Control of Cancer.

Manual of Work Division Procedure. Division of Research and Statistics and Finance Research Section. June, 1935.

Mortality Statistics For 1932. 33rd Annual Report. United States Government Printing Office, Washington, 1935.